Rock Products

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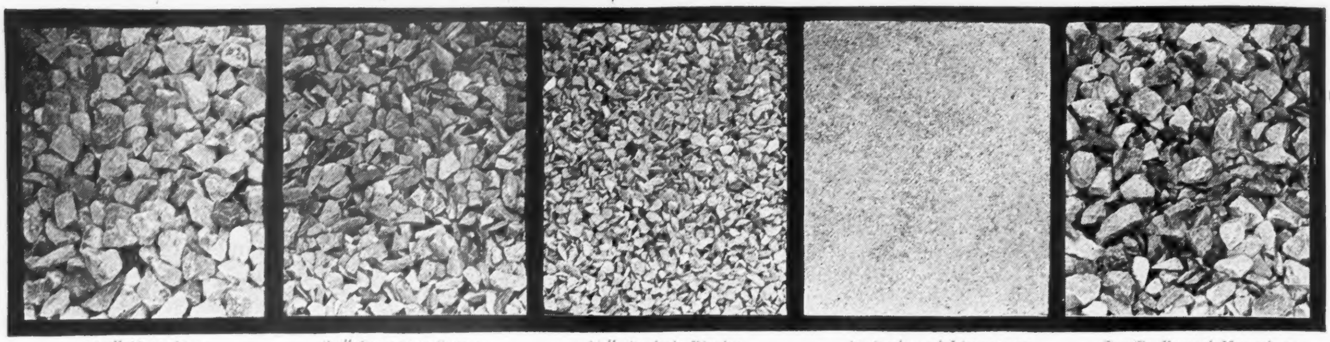

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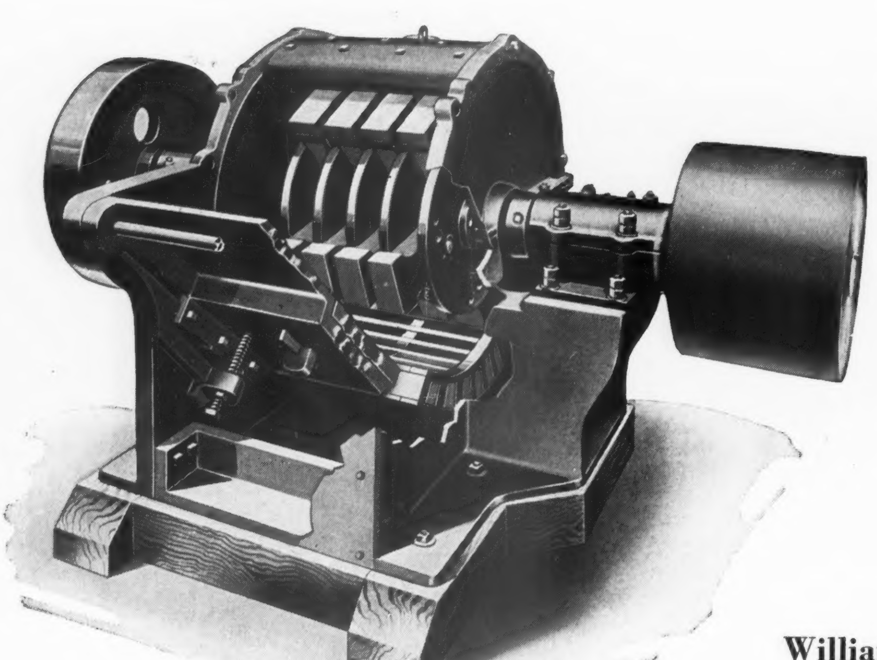

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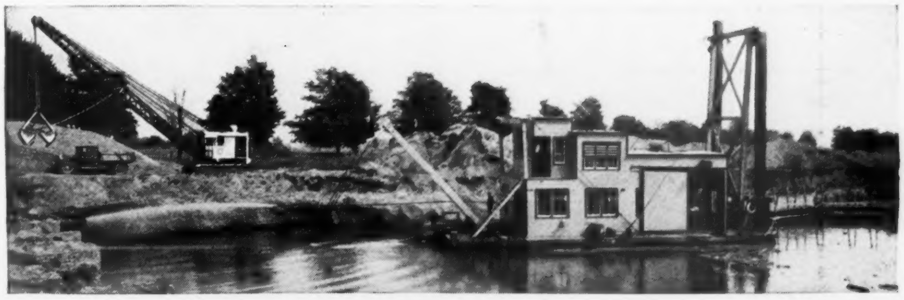

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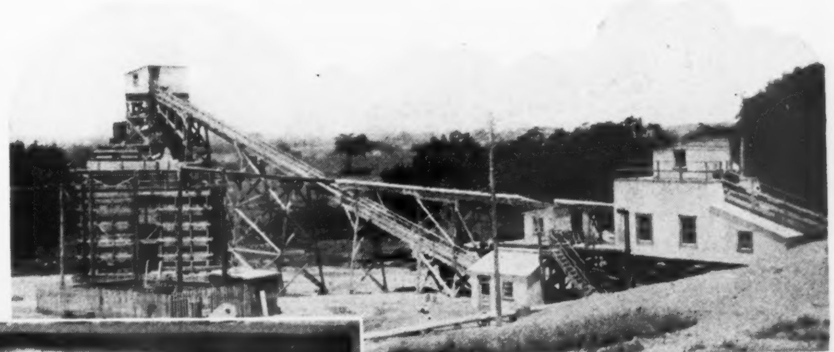
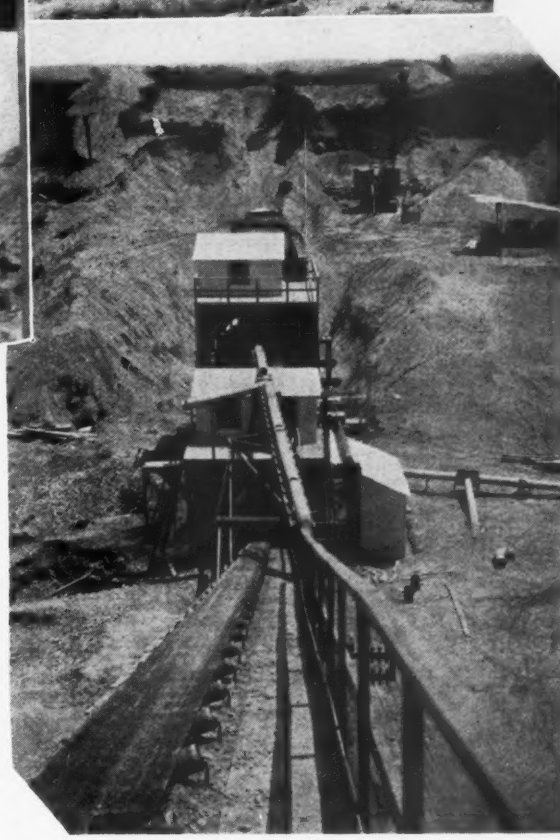




At right, side view of washing and screening plant; lower right, looking down from top of screen house toward primary washing plant and pit; lower left, pump house and settling pond

Dual Washing System at New Clarence Plant

THE CLARENCE SAND AND GRAVEL CO., with offices in Buffalo, N. Y., and one plant at Clarence, N. Y., put into operation during the present season a new plant near Alexander, about 33 miles east of Buffalo.

This new plant is unusual in that the sand and gravel are first washed over a vibrating screen to separate the gravel from the sand, after which each is further washed and then dewatered and carried on a belt conveyor to the top of the screening plant over the loading bins for final washing and sizing in the usual manner.

The plant is located in such a way that excavating from the pit is carried on at the level of the top of the hopper from which the material is fed to the plant. Excavating is done with a dragline outfit, consisting of a 3-yd. scraper and a two-drum hoist, which is silent chain driven by a 150-hp. General Electric slip-ring motor with drum controller. The scraper and hoist were furnished by the Street Bros. Machine Works. At the present time a Byers gasoline driven crawler type crane with an Owen clamshell bucket is also used in conjunction with the dragline outfit in getting the pit opened up.

The material from the deposit is scraped to a hopper covered with a rail grizzly to prevent any oversize material going into it, and is fed out at the bottom by a short, slow-moving, 30-in. belt conveyor feeder of the same type and size as is used at the Clarence plant. The hopper is of wooden crib construction of 2x8's on edge with two sides hoppered to give a long opening 2 ft. wide on to the feeder at the bottom. The feeder discharges in turn to a 24-in. inclined belt conveyor carrying up to the scalping screen, and is chain driven from the boot shaft of this conveyor, the speed of the feeder being so arranged that the belt cannot be overloaded. This simple but effective feeding arrangement has worked out very well at both plants.

The inclined belt conveyor from the feed

Loading hopper and pit viewed from primary scalping and washing building

Loading bins and screen house from primary scalping and washing building

hopper is driven by a 15-hp. 750-r.p.m. induction motor furnished by the Berger Bros. Electric Co., Rochester, N. Y., and arranged with a Link-Belt, herringbone gear reducer on the same base. The reducer is connected to the conveyor head shaft by a Link-Belt, steel-roller, chain drive, so that the conveyor speed may be changed if desired by changing a sprocket.

From the conveyor the material falls to a steel hopper from which it is sluiced by a stream of water to a 5-ft. by 8-ft., double-deck, Niagara vibrating screen, hung on steel cables and Texrope driven by a 7½-hp. 1500-r.p.m. G. E. motor. Either 2¼-in. or 2¾-in. mesh wire cloth is used on the top deck and ¼-in. mesh cloth on the bottom deck. Any oversize material passing over the top deck is spouted to a 24-in. belt conveyor for return to the crusher, while the gravel passing over the lower deck is spouted to a double screw (for scrubbing) furnished by the Perfect Classifier Co., from which it is spouted to the main belt conveyor carrying up to the washing plant over the loading bins. The sand and water passing through the lower deck of the Niagara screen is spouted to two parallel Good Roads drag classifiers below, from which the sand is discharged to the same main belt conveyor.

The return belt conveyor carrying the oversize back to the crusher is also used as a picking table for removing any objectionable material, and discharges into an 11-in. by 26-in. jaw crusher, made by the American Road Machinery Co. This crusher is belt-driven from a 40-hp. 750-r.p.m., G. E. induction motor, and the conveyor is belt-driven from the crusher shaft.

The crushed material falls to an 18-in. inclined belt conveyor driven by a 5-hp. motor with roller chain drive and is discharged back into the main hopper.

The Perfect classifier, which has two 18-in. screws, is arranged with three rows of jets above and three jets below, and is driven by a 15-hp. Berger motor through a silent chain.

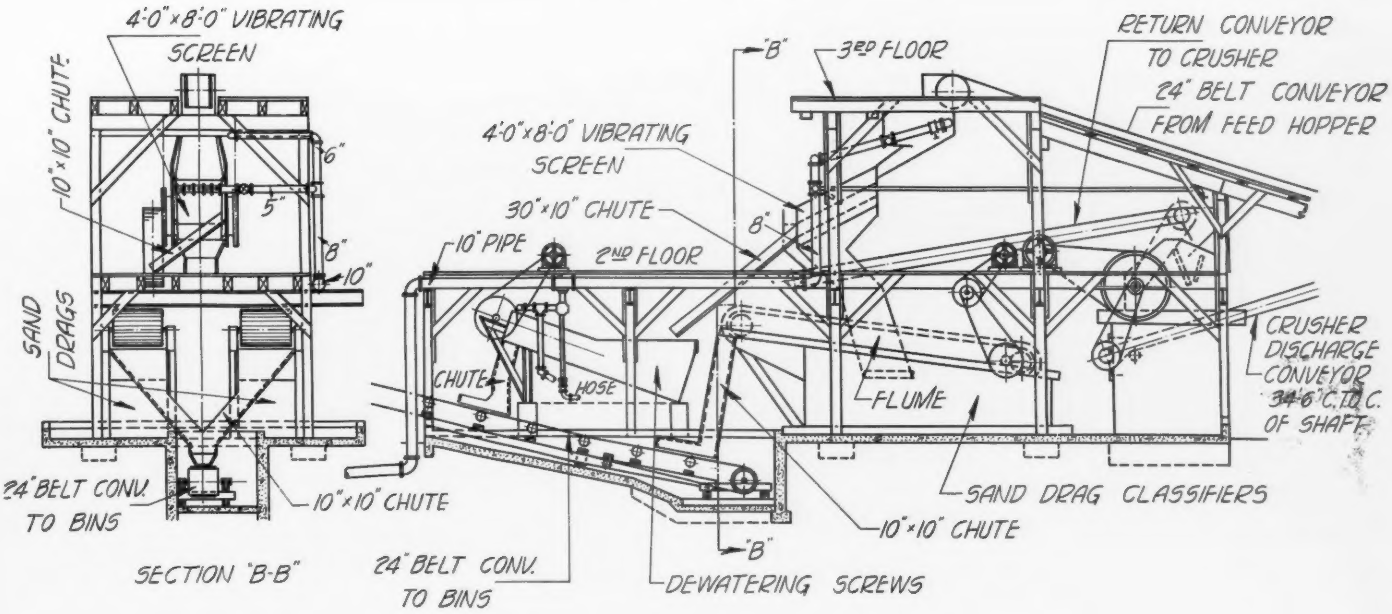
The two Good Roads drag classifiers for dewatering the sand have 48-in. by 5-in. steel flights spaced 12 in. apart, and each is driven by a 10-hp. motor (one Westinghouse and one General Electric) through silent chains and roller chains. The wash water from this part of the plant flows to a settling reservoir.

Final Washing and Sizing at Top of Plant

The main belt conveyor carrying all material from the first washing operation up to the screens over the bins is 24-in. wide with Link-Belt, Type "BB," ball-bearing carriers and "Quaker City" belting, and has a slope of about 18 deg. or 4 in. per foot. It is driven at the top by a 20-hp. Westinghouse motor through a Link-Belt, herringbone gear reducer and steel-roller chain, in the same way as the first conveyor, and has a pulley and brake band on the lead shaft with a toggle and counterweight arrangement to prevent reversal. (The sand is now pumped to the screening plant, as described later in the article.)

The conveyor discharges to a sluice box with double baffles and jets, which feed the material to a 4-ft. by 8-ft. double-deck Niagara vibrating screen with ¾-in. mesh cloth on the top deck and ¼-in. mesh cloth on the bottom deck. The screen cloth on the top deck is used only to protect the lower deck, all plus ¼-in. material being spouted to a second vibrating screen below, while the minus ¼-in. material and water is sluiced to a Link-Belt, Shaw classifier and four Telsmith sand-settling tanks. The coarse sand is removed by the Shaw classifier and the finer sands by the settling tanks, which are arranged in two parallel rows of two in series to split the overflow from the Shaw classifier. The overflow from the sand settling tanks flows to the waste pond where the silt is settled out.

From the first screen all plus ¼-in. gravel is spouted to a 4-ft. by 7-ft., triple-deck



Primary scalping and washing plant

Niagara vibrating screen with 1⅜-in., ⅞-in., and ¼-in. mesh cloth for final washing and sizing, these sizes being spouted to the bins below. Both screens are arranged with water jets directed on to the top decks, each screen having eight jets arranged in two rows across the screen, for final washing.

Shipping Facilities

The bins are of timber construction supported on a steel framework below, and are approximately 34 ft. wide by 48 ft. long by 20 ft. high with eight compartments, and with an additional four smaller compartments between for mixing and emergency use. They are completely decked over on top with openings for spouts and have four runways below for truck loading.

At the present time all deliveries are by truck, but it is expected that a rail connection will be put in later, at which time a belt conveyor will be run through the center space of the bins to a railroad loading point in much the same manner as at the Clarence plant. This plan will permit of drawing any size on to the railroad loading belt without disturbing the present truck loading facilities.

Water Supply

Water for washing is furnished by two pumping units, one for each part of the plant, each unit consisting of a 6-in. single stage, double-suction centrifugal pump delivering 1200 gal. per min., at 114 ft. head and direct-connected through a flexible coupling with a 50-hp., 1500-r.p.m. Westinghouse induction motor. These units are provided with SKF ball bearings and were furnished by the Union Steam Pump Co.

Both the suction and discharge lines are oversize to reduce friction losses in the lines, and each suction line has a swing check valve. The water supply is through a 16-in. line from a dam above the plant, this line being connected with the pump suction lines through valves so that either or both pumps may draw water from either the dam or the settling pond. The pumping units are started and stopped by push-button control through a Sundh automatic starting panel.

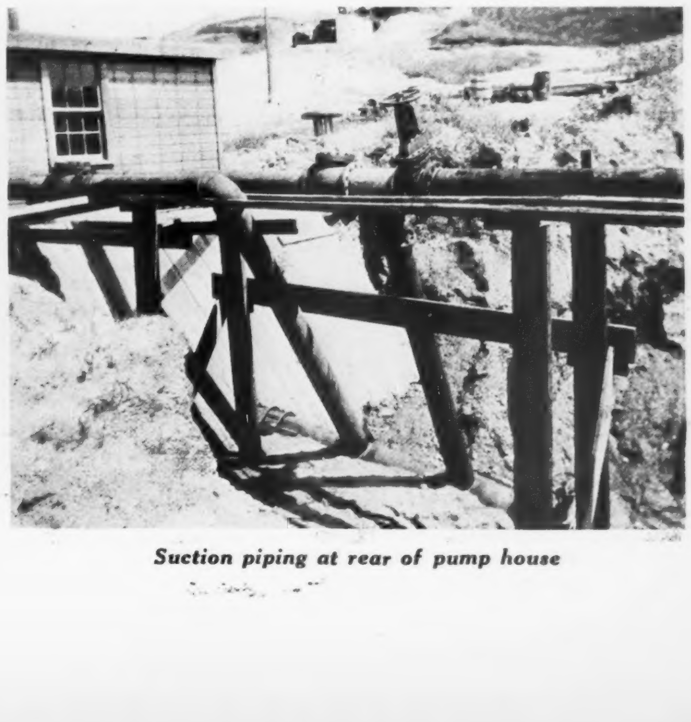
Electric Power

The electric power, which is transformed down at the plant, is 3-phase, 25-cycle, 440-volt. All of the plant motors may be controlled from one point through an automatic starting panel furnished by the Sundh Electric Co., or they may be started or stopped by other buttons located near the units.

The connected motor horsepower of the plant is as follows:

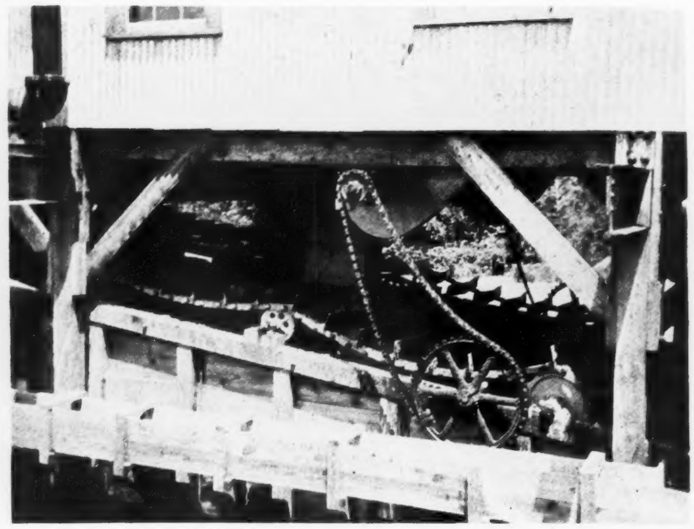
	Hp.
Dragline outfit	150
Belt conveyor to scalper	15
Scalping screen	7½
Perfect classifier	15
Jaw crusher	40
Return belt conveyor	5
Sand drag classifiers	20
Main belt conveyor	20
Two finishing screens	10
Two pumping units	100
	382½

Vibrating screen used for scalping



Suction piping at rear of pump house

Double screw classifier for dewatering gravel under scalping screen



Two sand drag classifiers used under scalping screens for dewatering sand

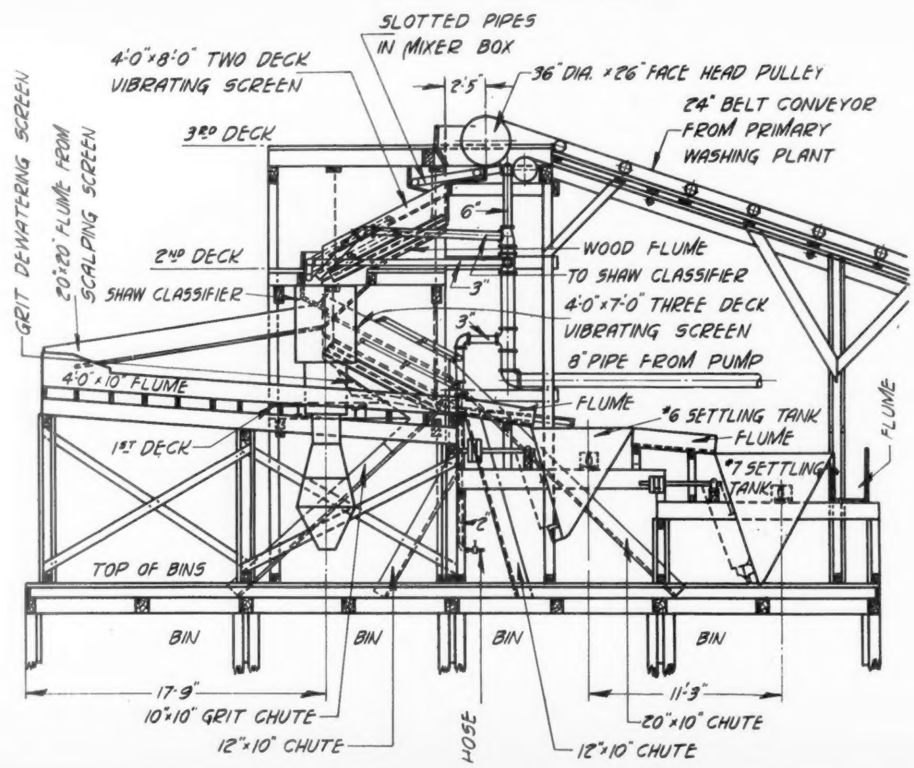
The plant was designed to have a capacity of 1500 tons per 10-hour day.

The company has offices at 403 Chamber of Commerce building, Buffalo, N. Y. M. P. Ryley is president and B. F. Maier, secretary. William Smallback is superintendent of the Alexander plant. The plans for the new plant were made by Nathan H. Sturdy, consulting engineer, Chamber of Commerce building, Buffalo, N. Y.

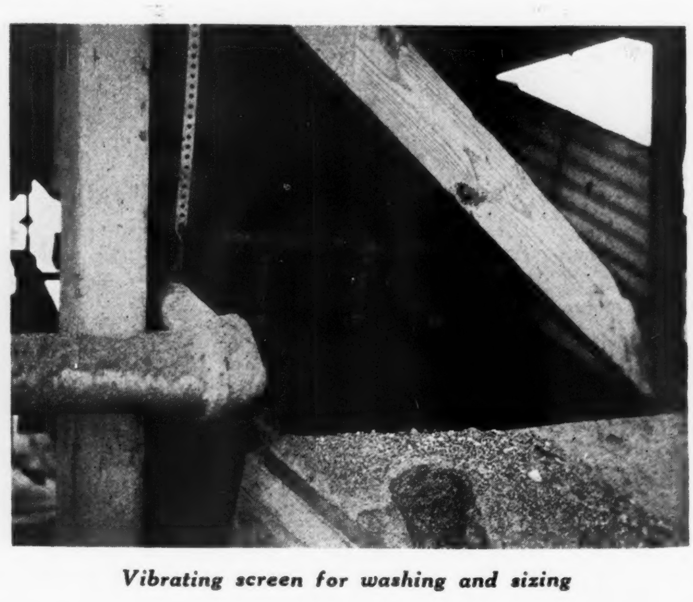
Changes in Conveying from Washing to Screening Plants

As noted in the first paragraph describing the final washing and sizing, and as shown in the view in the upper right-hand corner of page 34, a pipe line has been installed, which now takes care of the sand. This installation had been started at the time the description of the plant was written, but the writer and editor deemed it desirable to describe the plant as originally built, and then describe the changes, rather than leave out reference to the original features.

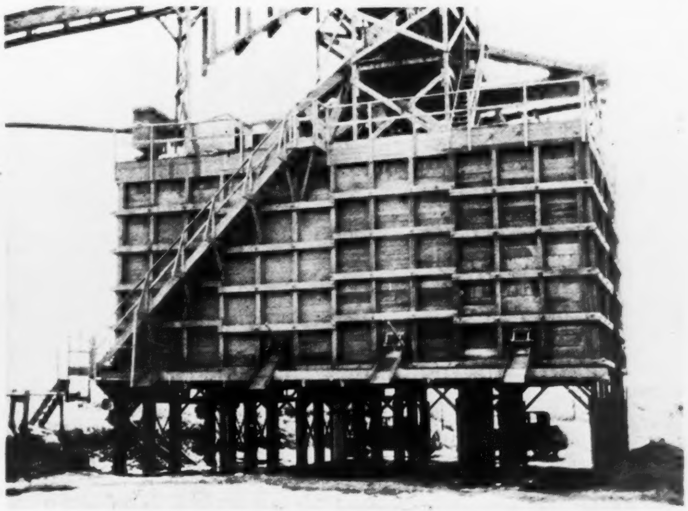
It has been noted before in the columns of Rock Products that the editors do not consider it good policy to rush into print



Top deck of bins, with Shaw classifier



Vibrating screen for washing and sizing



Bin construction and loading arrangement

with a description of a new plant before it has operated long enough to iron out the kinks that are apparently inevitable in every new plant. The present description is a good example, for after the plant had operated a short time it was found that the belt conveyor from the washing plant to the final screening plant would not handle satisfactorily the mixture of wet sand and gravel, due to the sliding back of the wet sand on the belt.

To overcome this difficulty the sand was discharged, at the preliminary washing plant, from the two drag classifiers to two screws for further dewatering. It was found in practice that the screws did not assist materially in the dewatering, although they are helpful in giving the material a thorough cleaning. Therefore a 6-in. sand pump, made by the Erie Pump and Engine Works, driven by a 75-hp., variable-speed Westinghouse motor was installed to take care of conveying the sand to the final screening plant.

The sand from the drag classifier is now discharged to a 6x6-ft. sump. As the pump intake is located at a considerable distance from the point of discharge of the sand from the classifiers, jets of water are played on the sand to prevent it from settling while being flumed from the point of discharge to the pumping sump. The pump is located directly over the sump with a short suction, and pumps a mixture of approximately 80% solids and 20% water through a 6-in. pipe line, which follows the inclined belt conveyor and discharges the sand into the receiving hopper above the upper Niagara screen. The belt conveyor now handles the gravel only, and the point of discharge for both sand and gravel is the same as before.

Changes at the Clarence, N. Y., Plant

The washing and screening arrangements at the Clarence, N. Y., plant, described in Rock Products, March 1, 1930, have been changed in several respects since that article was written, to give a more thorough washing and a greater capacity.

The material coming up on the main belt conveyor previously went to a 5-ft. by 24-ft. revolving screen and then over a 4-ft. by 7-ft., triple-deck, Niagara vibrating screen for washing and sizing.

The revolving screen has been made over into a revolving scrubber 9 ft. long, and a 4-ft. by 8-ft. double-deck, Link-Belt vibrating screen and a 14-ft., double-screw, Perfect classifier added. The material now goes from the belt to the 4-ft. by 8-ft. vibrating screen, from which all plus ¼-in. material goes to the scrubber and all minus ¼-in. and water to the sand classifiers. From the scrubber the gravel is further washed, dewatered and scrubbed by the double-screw classifier and discharged to the original 4-ft. by 7-ft., triple-deck, vibrating screen for final sizing to the bins. The sand and water passing through the first screen, as well as the overflow from the screw classifiers, is flumed to the Shaw sand classifiers. Two additional classifiers of this type, making six in all, have been added in order to collect more of the fine sand.

These changes have resulted in an increased capacity and an even more thorough washing of all sizes.

A 10-in. by 30-in. Good Roads "Champion" jaw crusher has also been installed for additional recrushing, and a 1-yd. three compartment Type "BW" Aggremeter furnished by the Erie Steel Construction Co. has been installed for truck batching.

Radiant Limestone—an Unusual Crushed-Stone Product—Finds a New Market

A SPECIAL QUALITY of limestone quarried at the Carey, Ohio, plant of the National Lime and Stone Co., whose main offices are in Findlay, Ohio, can be used in building luminous runways for airplane landing fields, thus proving a distinct advantage to night fliers.

Announcement of the new limestone has just been made to the trade by the National Lime and Stone Co.

Realization that the stone was particularly suitable to this use followed the discovery by air mail pilots that the quarries at Carey glow with a pale but easily distinguishable light at night.

It has later been found that the crushed rock from the quarry retains the same luminous qualities and that roads built of it are easily seen from the air at night. Numerous tests have been made and the product is now being placed on the market by the National Lime and Stone Co., under the name of "Glowrock."

The municipal airport at Akron is among the first to undertake construction of runways from the new material. Tests on a large scale are being conducted there by B. E. Fulton, manager of the airport, with a view to the self-illumination of all runways on the field.

Mr. Fulton has been much interested in the new product seeing in it great possibilities for the safety of night flying. He predicts that "every airport that is used much at night and particularly the ones that cannot afford continued artificial illumination, will adopt the 'shining stone' idea."

Officials of the Rummell Airport in Findlay also have investigated the possibilities of the new product and plan to use it on runways here.

The product is a highly crystalline, dolomitic limestone rock, white in color and having a phosphorus content which causes it to glow in the dark. Its luminous properties make it visible for miles from a plane flying at night. The quarries at Carey are considered as a landmark or a beacon by the pilots flying over that vicinity at night.

The luminous stone has long been used and recommended for the construction of berms along highways.

Where runways have already been constructed of concrete or asphalt, it is recommended that berms be built along each side of such runways of the new luminous stone, thus clearly marking it so that fliers know that they are landing between the two white strips.

Two grades of the new rock are recommended in the construction of runways, a coarse grade of which a base 4 to 8 in. deep is suggested to be covered with a top dressing of a finer grade which seals and cements the whole, it is said.

While this material sets up in a semi-rigid condition, it is claimed it is still elastic in nature. It will not crack and will not freeze to any extent in the coldest of weather, the surface remaining dry under all weather conditions. By test made by the company "Glowrock" chips will not pick up or blow away when machines are landing or taking off, but give a surface free from dust which might injure the fuselage or other parts of a plane.

Another chief advantage claimed in constructing runways of this material is in the taking off of planes, that its granular broken surface and elastic condition will prevent them from skidding as the tail skid will be held in straight line of flight. Likewise in the landing of a plane, there is less danger as the tail skid or a wheel will keep the plane in a straight line of flight; and where brakes are used on larger planes they are more effective on a runway of this kind, making taxiing much easier.—*Findlay (Ohio) Republican.*

Lime Production Methods of Europe and America

Part I—Some General Observations and My Itinerary

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

EUROPEAN AND AMERICAN LIME PLANTS are not directly comparable, for conditions are quite different. For a European to visit the United States and say that in general we are backward and that our systems and our method of manufacture are all wrong (as some are inclined to say) would not be exactly proper. It also would be improper for us to criticize the European plants. We can contrast the performance, yes, but we must not criticize except only when the fundamental conditions are fully alike, or when full allowances were made for the differences.

A prominent European lime manufacturer visited the plants in our Ohio finishing lime district and was displeased with what he saw. Small kilns, rows of them, low capacity, poor fuel efficiency, with nothing like it anywhere in Europe. The Ohio kilns were producing eight tons of lime per day each and his kilns in Germany 140 tons each. The fuel efficiency in Ohio was about four to one with magnesium lime, the European was obtaining six to one with high calcium lime. Very poor showing for us, it is true, but if the German had burned our limestone in his kilns the lime would not have had the color nor the plasticity expected from the Ohio lime. As a finishing lime it would have been worthless. The demand for it would not have been country-wide, and it would not have been shipped over thousands of miles as it now is.

In Europe, labor conditions are entirely different, lime requirements are different, methods of production and handling of limestone and lime are different. Even much of the limestone and fuel is different, as is the method of burning, and so naturally also the quality of the product. In our case some demand lime very soft burned, others very white in color, others very low in arsenic, others very plastic or quick setting, or of particularly high availability, quickly slaking, etc., etc. In this country, Ste. Genevieve, Mo., lime is shipped across Ohio to Niagara, and Ohio lime is shipped across Ste. Genevieve to Texas, with a valid excuse for both. Under all these varied conditions one has to be very careful before turning critic; but to contrast, however, is perfectly proper, and by open-mindedly contrasting our condition with the European we can learn a great deal.

Victor J. Azbe

My Itinerary—and Entertainment

I have traveled to Europe for the purpose of lime plant study on two occasions. During these trips 18 different countries were visited, including Norway, Sweden, Denmark, Germany, Belgium, England, France, Holland, Austria, Czecho-Slovakia, Jugo-Slavia, Hungary, Italy, Switzerland, Roumania, Bulgaria, Turkey and Greece. Fig. 1 shows this year's trip, which was made entirely by air. Experiences, mostly pleasant but some unpleasant, were numberless. Among the former is the flight over the Alps in A-57, Fig. 2, and among the latter was a forced landing in the position shown in Fig. 3, when except for some temporary excitement, several days in bed, and a good excuse for carrying a cane for a couple of weeks, no other harm came to me.

On this trip many countries were visited where I could not speak the language, and as the lime plants ordinarily are off the beaten path, in some of these cases even the management did not understand English or German. French would have been handy on many occasions, and even my small knowledge of Italian was useful. Particularly awkward was ordering meals in hostelries, since I did not know what they had and they

Editor's Note

THE EDITOR frequently regrets that a conscientious view of his duty to his journal makes it necessary for him to delegate to others work which would certainly be matter of great pleasure. In reading Mr. Azbe's introduction to his second series of articles, based on a second trip to Europe in the interest of Rock Products, a feeling akin to remorse fills the editor's mind—as it doubtless will the minds of our equally unfortunate readers.

Nevertheless, the editor knows he could not have done anywhere near so good a job for his journal as Mr. Azbe has done; so he feels that both his journal and its readers are especially fortunate.

Following a sketch of some of his social and business contacts in Europe, written in his usual happy vein, Mr. Azbe proceeds to draw some interesting contrasts between lime manufacture in Europe and in this country; noting not only the differences in kilns but in the lime products made.

This series by Mr. Azbe, we know, will be even more interesting and helpful to American lime manufacturers than his first series, which was published in Rock Products, January 21, 1928, to February 2, 1929, inclusive. As invariably happens to a modest and intelligent man, one does not find out how little he knows about his subject until he sits down to explain it in detail to someone else. So Mr. Azbe found many gaps in the information he acquired on his earlier trip; and like the ambitious expert that he is, he was not satisfied until he had made a second trip to fill up the gaps in his knowledge of European lime manufacture.

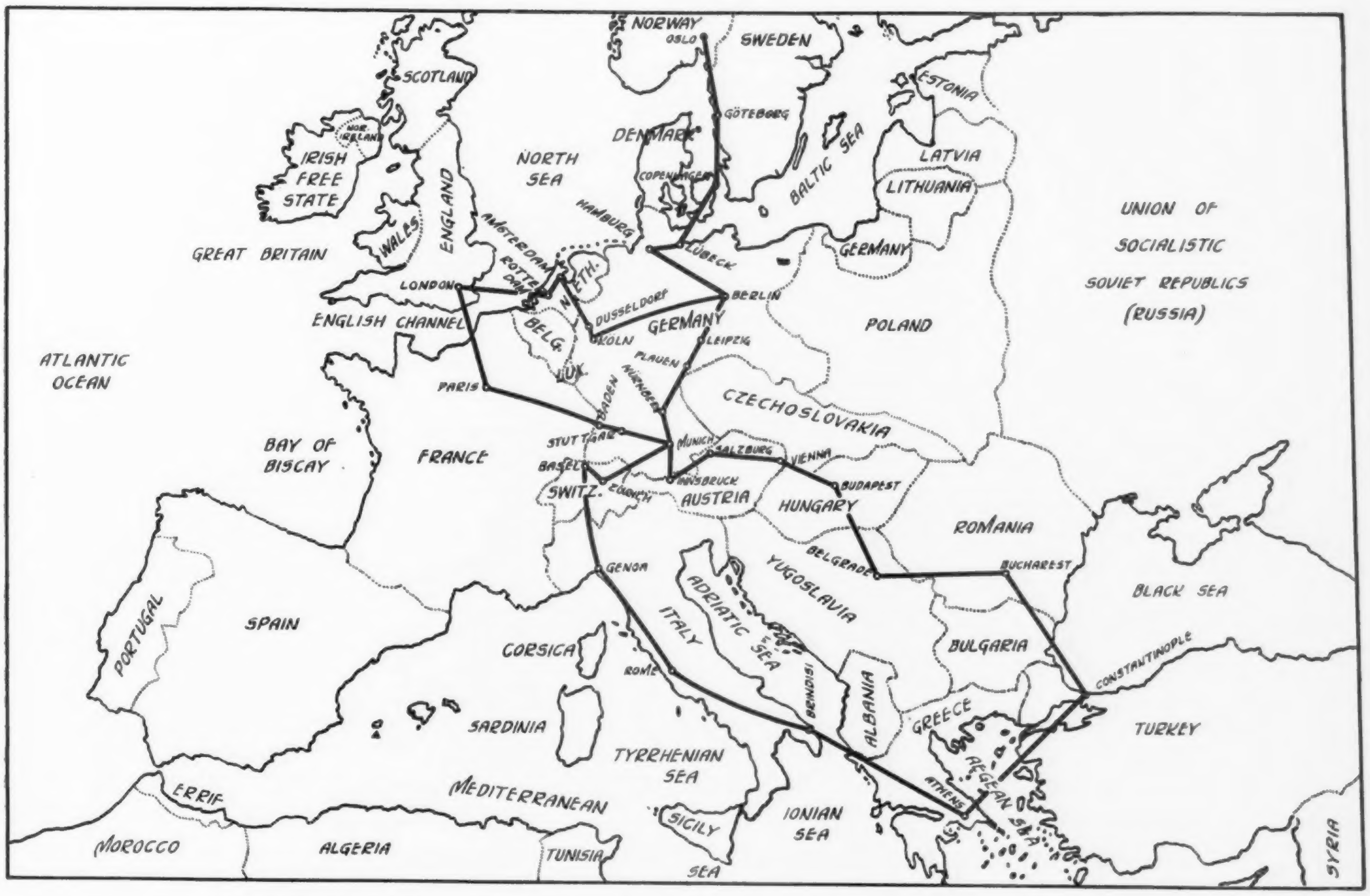


Fig. 1. Black line shows flying route of Mr. Azbe when inspecting European lime plants

Fig. 2. Our flight over the Alps in A-57

Fig. 3. This forced landing delayed the trip several days

did not know what I wanted. If the waiter and myself would both have been deaf and dumb it could not have been worse. In some places they would hand me the menu, as once under particularly awkward conditions in Hungary, but that was not of much help, because the items read as follows:

"Borju pörkölt Galuskaval	1.90
"Sertes karaj par. kap	2.70
"Erdélyi rakett kapozzta	1.60
"Szalen tüdö citrommal	1.50
"Borjülab rautva tartar m	1.50
"Rablóhus myárson sütve	3.60"

In Greece (Fig. 4), with the Greek instead of Latin script, one could not even read it, much less understand it, and in Sweden, after I ordered "Smorgelsbrod," I was even more confused, because it consisted

Fig. 4. So this is Greece!

of a tableful of thirty different and distinct dishes.

I must confess that lime and lime manufacture was studied not only during daytime in the plants, but often long into the night, and several times until daybreak. Such sessions always were very enjoyable, as proven by Fig. 5, which presents the host, Comercienrat Zetto, our old friend, Director Ludowigs, Chief Engineer Seeger and myself.

On many occasions I was received at the houses of lime plant executives. It was a great pleasure to be the guest of the delightful Mrs. Ludowigs (Fig. 6), whose graciousness seemingly was appreciated even by the fish in her pond, which always swarmed to her at her call. The lovely homelike reception at the home of Mr. and Mrs. Walter

Fig. 5. Entertained by noted lime men

Fig. 6. In the garden of the Ludwigs home

Witschel, of the Tschirnhaus A.G. (Fig. 7), then the trout feasts put on by the genial Director Rinker, supplemented with an elaboration of liquid refreshments. Director Rinker (Fig. 8), as well as Comercienrat Zetto, Director Ludowigs and Mr. Witschel will be mentioned again and again in these pages when describing their plants.

In Germany gas kilns are used for lime burning to only a comparatively small extent and rotary kilns not at all. In the main the Hoffman or ring type kiln and the mixed-feed kiln are utilized, neither of which is very familiar to the American lime manufacturer. Also, in Germany much hydraulic lime is made, which is hydrated by an entirely different process from that common in America, so the whole becomes rather strange to an American and quite difficult to explain.

Fig. 7. Mr. and Mrs. Walter Witschel at home

It therefore is very fortunate that the German Lime Manufacturers Association presented the writer with the photographic reproduction given in Fig. 9. This is a copy of a wall painting in the lime section of the world's most wonderful technical museum in Munich, Germany. It is admirably composed to show the various component parts of a lime plant to students and to the general public visiting the museum, and it can also serve exceedingly well to show American lime manufacturers the main features of a better type European plant. During the first part of this series we will continually refer back to this illustration and explain it somewhat in detail.

In the background of the illustration the quarry can be noted. It is worked in several benches. This bench system of operation is very extensively practiced at many of the German plants. Fig. 10 is an aerial view of the incipient stages of the removal of an entire mountain at Katzbach, Silesia (Tschirnhaus A.G.). There seems to be a series of some ten benches which, only in the photograph, appear diminutive.

From the quarry in Fig. 9 the limestone is conveyed to the plant by aerial tram, so popular in Germany—a cheap method of conveying over long distances and particularly practicable where the ground is uneven. The system operates quite as well over high hills and deep valleys as over level ground. These systems can have the elaborateness with steel towers of Fig. 11, as well as the simplicity and cheapness of wooden construction shown in Fig. 12.

In the distant background towards the right one notices old field kilns. These kilns were intermittent in operation, first charged, fired, and then completely withdrawn. Naturally they were inefficient, and therefore it is also natural that they are not used any more in Germany. Such kilns, however, and others even smaller can still be found in operation in Roumania and in other industrially less progressive portions of Europe. In a Roumanian plant they were found sown over a large plot of ground like the brick kilns over here, only they were much smaller, not much larger than village bread-baking ovens found in Greece. To me, they were a highly amusing sight. I was anxious to photograph them, but the manager would not allow it. The whole was rather laughable. He was suspicious of me, afraid that I may make some practical use of it that might hurt him as a producer of lime. If the kilns would have been highly developed and very efficient there might have been a cause, even though not an excuse, for his attitude; but the kilns were as inefficient as any kiln ever was since lime burning was started.

Fig. 13 shows a closer view of a field kiln. The contrast of this with modern plants such as are to be shown later is indeed encouraging. The lime industry, at least as far as manufacture is concerned, does move forward in Europe as well as in America, only the progress is so slow that apparently

Fig. 8. Director Rinker

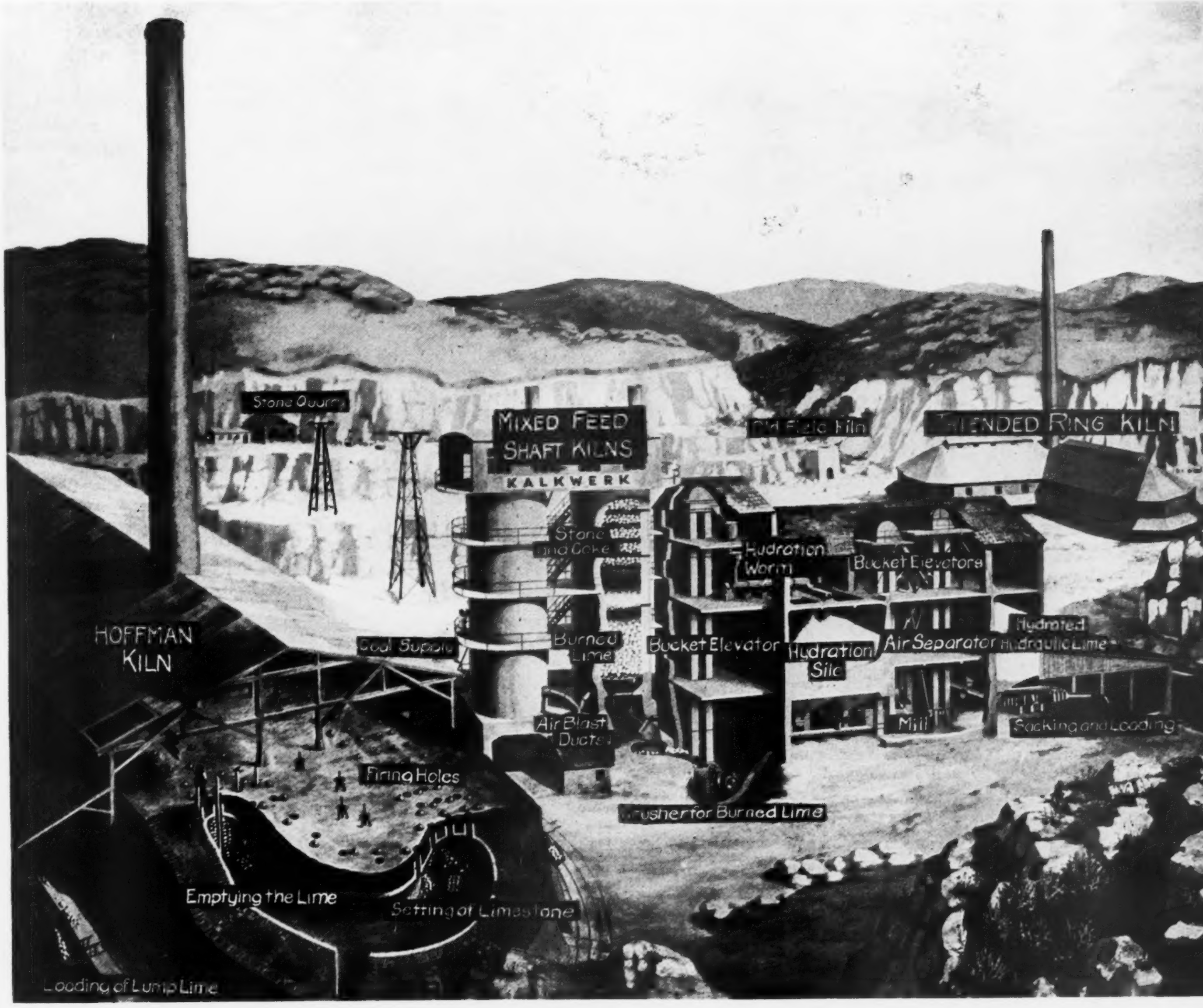


Fig. 9. Copy of a wall painting in the technical meseum at Munich, Germany, showing the various parts of a lime plant

a decade is needed to note the improvement. One would feel quite hopeful, if it were not for the few uninformed manufacturers that today still insist on erecting equipment that was obsolete ten, and probably twenty, years ago. One prominent American lime manufacturer stated not long ago that if he built another plant it would be so located and of such construction that he could operate it with machinery no more complicated than a wheelbarrow. An excellent idea indeed for American pre-Revolutionary times.

A Very Large Ring Kiln

In the left forefront is a typical Hoffman kiln, also called a ring kiln. These kilns are used to a considerable extent in Germany. I described their operation in my first European series, published in Rock Products. They are not inefficient, but they certainly are hard on the men that have to work in them.

In the beautiful Harz section of Germany I have seen the largest of these kilns in operation. It was so large that it had three fires, so to speak, chasing each other, with the charging and discharging of stone and lime going on between each two fires. The kiln was 790 ft. long and had 42 chambers. Before going into the kiln I was cautioned not to mention the heat so the workmen would hear me. I later wondered as I found out that with temperature outside at 86 deg., inside where the men loaded the lime it was 137 deg. F. I presume only the dryness of the heat made it possible for them to stand it; and, further, that there was nothing weak about the men is shown by the general huskiness of the group in Fig. 14. The whole certainly would have been beyond the possible in any American plant. All the men would have deserted, and one could hardly blame them.

The kiln I refer to in the foregoing paragraph had the shape of the three-armed ring kiln shown in Fig. 9 on the rear right. These multi-armed shapes are given the kiln to prevent it from being too long in its larger sizes. The operation, however, is exactly the same as that shown in the cutaway view in the left foreground.

These kilns are popular when lump lime is desired. In them, there is little breakage. The stone has to be laid in by hand and that in a certain, particular way. Canals for draft must be built in along the bottom, and then there are vertical openings terminating in the firing holes through which coal is fired. By observing closely one can see men charging as well as drawing the kiln.

Fig. 15 is from a photograph I took in a kiln of the side where the charging is going on. The draft canals are plainly visible. Note the care with which the stone is laid; a premature collapse would seriously interfere with the operation. In Fig. 16 the burned section of the kiln is shown and the contrast between the two is very interesting.

Lime as it burns, except when it is very mildly burned, shrinks. Hard burned lime shrinks quite decidedly. This shrinkage is not noticeable in an ordinary kiln due to packing. It is, however, quite plainly noticeable in the ring kiln. In Fig. 15 the stone is right up to the roof while in Fig. 16

there is a large space between the lime and the roof.

Some plants have a great number of these kilns stretching over a long distance as in Fig. 17, showing part of the plant of Tschirnhaus A.G.

Fig. 18 shows the top of one of these kilns with the great multitude of firing holes and piles of coal lying to the side. This coal is brought in on monorail carts and dumped.

In the foremost right of Fig. 9 the loading of the lime by dumping the carts into the railroad cars can just be noted. For lime in Germany, generally a special car is used that greatly facilitates loading and unloading and saves much labor over methods used over here. These cars of the larger type can be seen in two views in Figs. 19 and 20. They can be loaded as gondola cars, unloaded as side-dump cars or as box cars, and are quite weather-tight.

To the right of the ring kiln, another type of kiln is shown, of much greater interest to us in this country—a kiln somewhat similar to a blast furnace into which coke and limestone are fed, either in alternative layers or completely mixed. In Fig. 9 the layer principle is used and the layers can be distinguished in the upper portion of the kiln, with only the lime left below the burning zone. In the upper zone the stone and coke are thoroughly preheated with waste gases. In the burning zone combustion takes place adjacent to the stone and lime, with little possibility of heat loss due to radiation. In the lower portions the lime is cooled and the air for combustion thoroughly preheated.

Fig. 10. Aerial view of working of lime deposit at Katzbach, Silesia

Such kilns, due to concentration of the heat transfer zone, if properly operated so there is complete combustion and adequate preheating and cooling of stone and lime, are considerably more efficient in respect to fuel than any other kiln can be.

While such kilns can be operated with natural draft, in the modern plants forced air blast is used, this being shown in our view. At times extremely high blast pressures are maintained. I found them as high as 18 in., water gage; but then also very high capacities were obtained, up to 150 tons of lime per day from a kiln whose shaft was round and only 10 ft. in diameter.

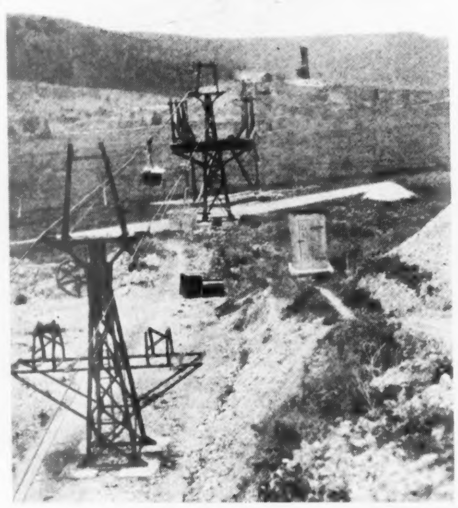


Fig. 11. Aerial tramway with steel towers for conveying raw material

Most of these kilns are hand-drawn, but many are automatically drawn. The base of our kiln is of the latter type and the illustration shows some kind of a grate which revolves, shearing out the lime which falls through two alternately opening gates so that the air pressure in the kiln base is not destroyed.

One should note the observation galleries and observation holes through which the location of the burning zone as well as its height can be watched. Labor, especially on the high capacity kilns, is low and generally speaking these kilns lend themselves

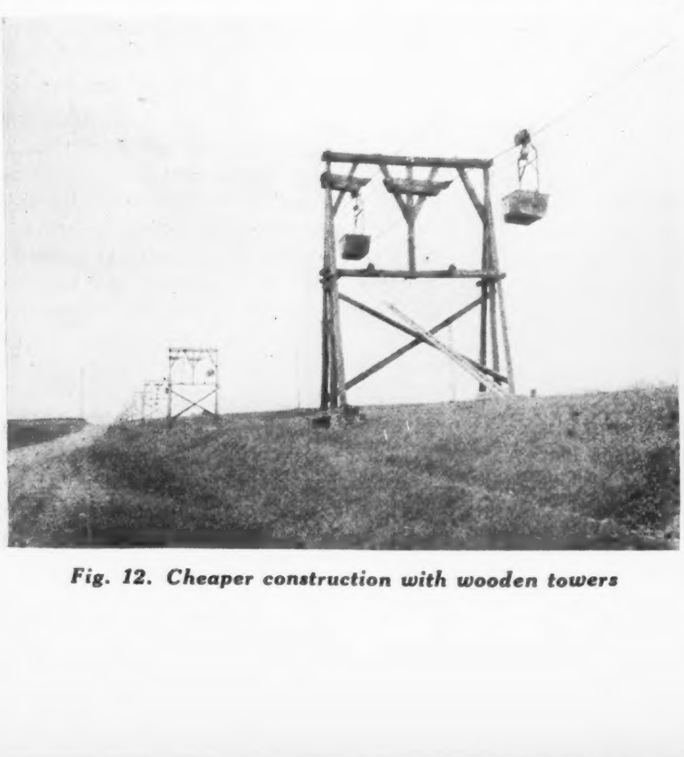


Fig. 12. Cheaper construction with wooden towers

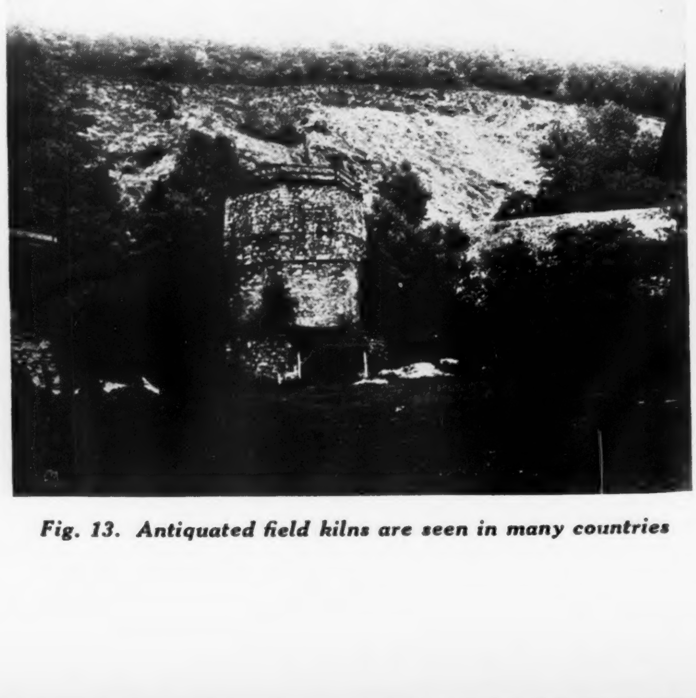


Fig. 13. Antiquated field kilns are seen in many countries

admirably to market conditions existing in Germany as well as elsewhere in Europe.

One would think that with the high fuel efficiency, high possible capacity and low labor that are characteristic of these kilns, they should supplant all other kilns over here. But then, there are objections also. A mixed-feed kiln will not give as pure lime because the coke ash is admixed, and even in Germany the smaller portions of the draw containing most of the ash are stored in the open, often in very great piles, and this lime is sold very cheaply during certain seasons of the year to farmers for fertilizing purposes. Then coke ordinarily costs more than coal which, in part, offsets the higher efficiency. Also, the color of the lump lime lacks the whiteness possible when lime is burned with gas. Nevertheless, mixed-feed kilns will certainly be used to a great extent over here in the future. Now some chemical concerns that produce more lime than any of the regular lime manufacturers use mixed-feed kilns exclusively. In this country one can find plants having stretches of small kilns, each putting out 30 tons of lime, and other plants where large kilns put out 150 to 200 tons. No such capacities are possible with gas kilns. Neither can a gas kiln give as long a life between repairs as a mixed-feed kiln, in which runs of two to three years are common.

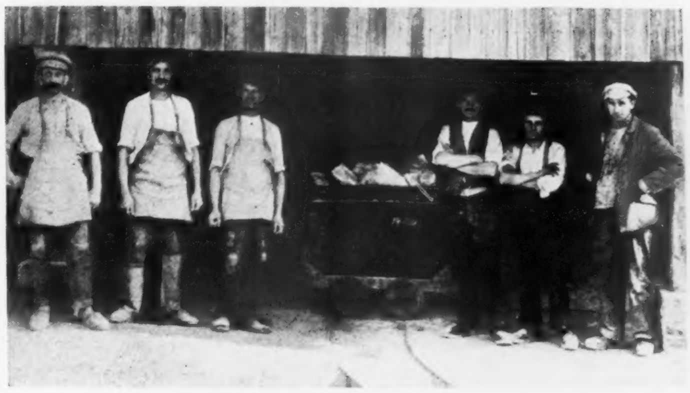


Fig. 14. These men work in a kiln room where the temperature is 137 deg. F.

Adjacent to the mixed-feed kilns in Fig. 9 is located the lime handling, crushing, hydrating, storing and sacking plant. It is quite different from ordinary American types because the lime is different.

Hydraulic Limes

Generally speaking we can divide lime into five main groups: High calcium, high magnesium, and mildly, medium and eminently hydraulic. Tabulating their main properties, we get the classification below.

It will be noted that the hydraulic limes contain a certain amount of clay matter which, if of proper nature and well disseminated, gives the lime mild cement properties, with the hardening not so dependent upon CO_2 re-absorption; for example, the eminently hydraulic lime will, after one year, set to stone even though submerged under water.

CLASSIFICATION OF LIMES

	CaO	MgO	Active SiO_2-Al_2O_3	Slaking rate	Consistency, one year in water
High calcium	+90%	— 5%	....	Fast	Putty
High magnesium	+60%	+30%	....	Medium slow	Putty
				Slow	Intermediate
Mildly hydraulic	+80%		—15%	Very slow	Hard soap
Medium hydraulic	+70%		15–25%	Requires	Stone
Eminently hydraulic	+60%		25–35%	grinding	

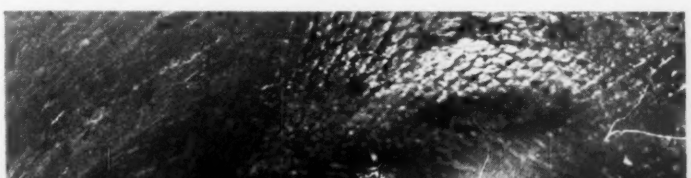


Fig. 15. Charging side of kiln, showing draft canals and care in formation of pile

Fig. 16. Burned section of same kiln, showing shrinkage of lime

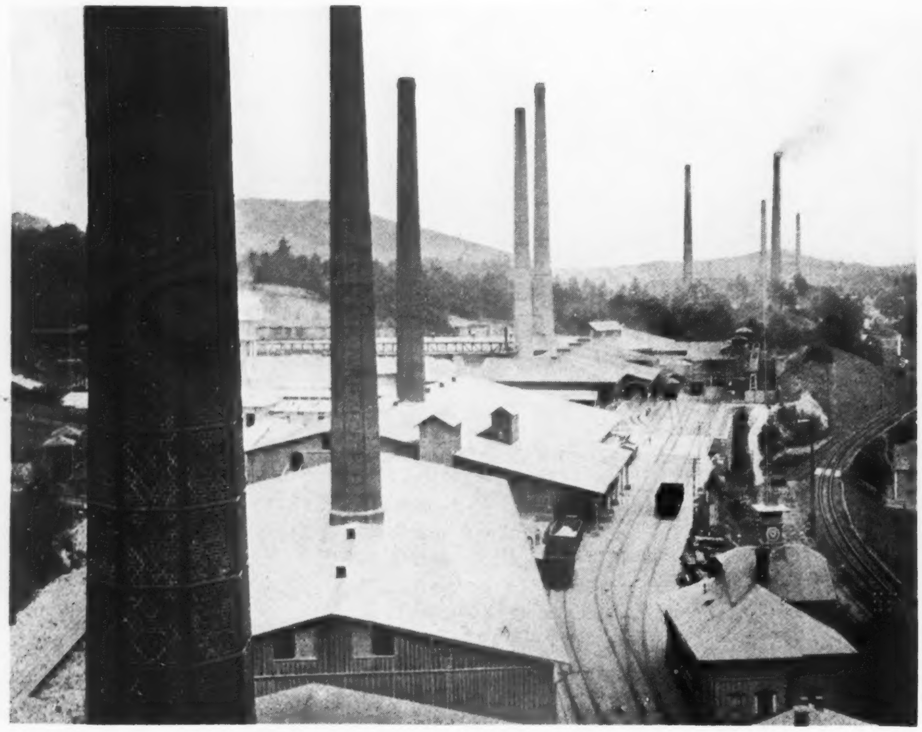


Fig. 17. Some plants have many kilns widely separated

Fig. 18. Top of a German kiln with a multitude of firing holes

While much of the high calcium lime is used in Europe for building purposes, the hydraulic lime is used to a very much greater extent than over here. The preparation of this lime is somewhat different and is the main reason for the difference of the arrangement in Fig. 9.

The conveyor under the two kilns receives the lime continually discharged from the kilns and delivers it to a crusher located in the pit. The crushed lime is then elevated by the bucket elevator and discharged into a horizontal screw conveyor, which is called a slaking worm, but is not actually that, but rather merely a method where water added is uniformly distributed. There is little slaking taking place in the time the lime passes through the conveyor because hydraulic lime slakes slowly. It then is discharged into the large, concrete hydrating bin, where the disintegration of the lumps and the actual hydration or slaking of the free lime takes place.

Some Clinker to Be Removed

Some of the lime containing higher portions of the clay burns into a clinker which fails to disintegrate into fine powder while in the hydrating bin. This explains the further processing parts of the plant. A horizontal conveyor removes the lime from the hydrating bin and discharges it into an elevator. Next, it passes through an air separator, with the fines discharging into another elevator, which delivers the lime into the finished lime storage bin. The coarser, clinkery portions find their way into the mill where they are ground to a fine powder, then returned to the finished lime stream; or, this material having properties more approachable to cement, is sold as special product.

From the finished lime bin the lime is

THIS series by Mr. Azbe, as you have discovered by reading the present article, is going to be not only illuminating regarding the practice of lime manufacture in Europe as compared with our own methods, but is highly entertaining because of the manner of writing which the author has chosen to adopt. And again, as a pictorial record alone it was worth the trip—even though minor accidents occurred, as one must expect in flying through the air.

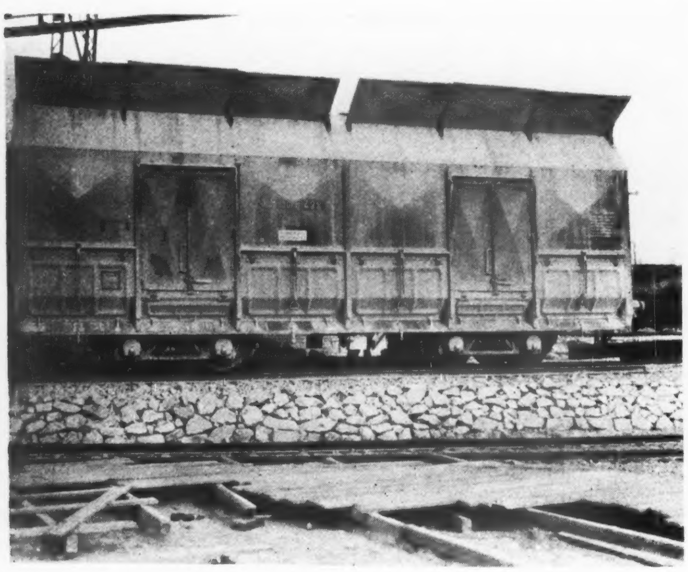


Fig. 19 and 20. Special railroad cars used in Germany for hauling lime. They are weather-tight and can be loaded as gondolas and unloaded as box cars or as side-dump cars

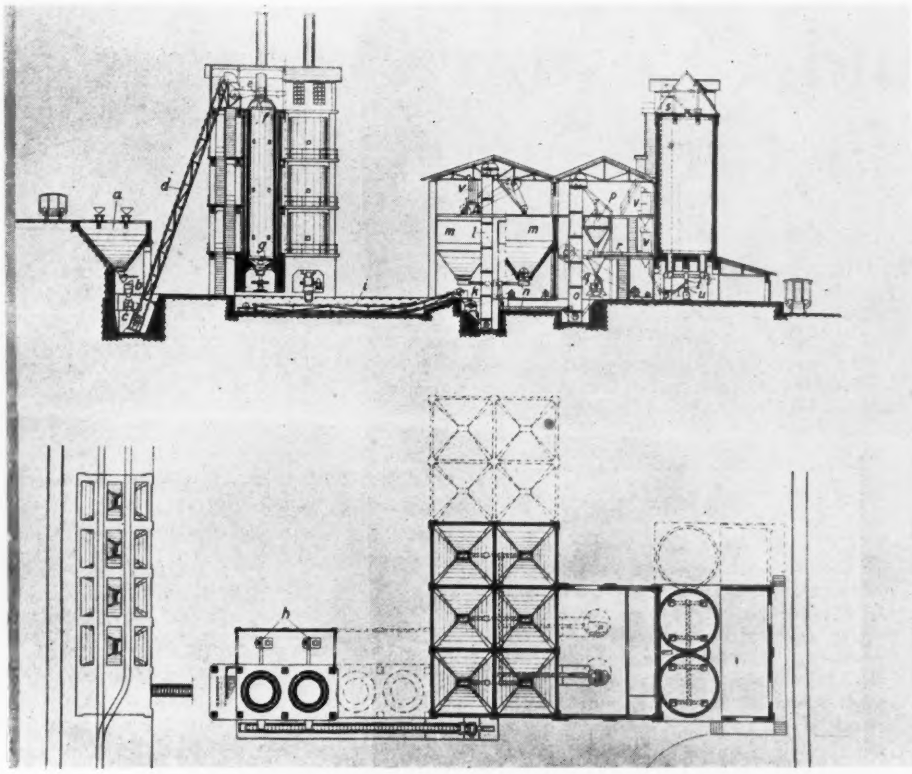


Fig. 21. Plan and elevation of lime plant built by Curt von Gruber at Rudersdorf, Germany

drawn, sacked and loaded for shipment as shown.

Fig. 9 was drawn to show the most in the least space and does not represent any particular plant. Fig. 21 gives a plan and elevation of the plant at Rudersdorf near Berlin built by Curt von Gruber. The units referred to by the letters are:

(a) Bin for limestone and fuel.
(b) Feed regulating bin.
(c) Box conveyor.
(d) Inclined conveyor.
(e) Kiln feeding conveyor.
(f) Rotating hopper feeder.
(g) Rotary grate with bucket discharge apparatus.
(h) Fan.
(i) Conveyor.
(k) Hammer crusher.
(l) Bucket elevator.
(m) Hydrating bins.
(n) Bin discharge.
(o) Feeding elevator.
(p) Feeding hopper.
(q) Feeder.
(r) Mill.
(s) Air separator.
(t) Compound fan.
(u) Fine meal cyclone.
(v) Dust collecting plant.
(w) Fine bins.
(x) Bin discharge conveyors.
(y) Bagging scales.
(z) Store and shipping room.

(To be continued)

New Agricultural Lime Terms Adopted by Chemists

AT THE 1930 ANNUAL CONVENTION of the Association of Official Agricultural Chemists, held October 20-22 at Washington, D. C., the following terms were adopted as official, superseding previous definitions, as well adding others in order to make the nomenclature of this branch of the lime industry complete:

Agricultural Lime and Liming Material.—Any neutralizing substance containing calcium and magnesium oxides in condition and quantity suitable for use in agriculture.

Lime.—The word "lime" when applied to liming materials means calcium and magnesium oxides.

High Calcium Lime Products.—Those classes of liming materials containing not less than 45% of calcium and magnesium oxides and not more than 4% of their total oxides of calcium and magnesium as magnesium oxide.

High Magnesium Lime Products.—Those classes of liming materials containing not less than 25% of their total oxides of calcium and magnesium as magnesium oxide.

Quicklime, Burned Lime, Caustic Lime, Lump Lime, Unslaked Lime.—Liming materials having a high content of calcium oxide and magnesium oxide resulting from heating suitable carbonates until substantially all the carbon dioxide has been eliminated.

Hydrated or Slaked Lime.—The product obtained by treating quicklime with sufficient water or steam to combine with its oxides.

Air-Slaked Lime.—The product obtained by exposing caustic lime to the atmosphere, whereby it absorbs moisture and carbon dioxide.

Ground Limestone.—The product obtained by grinding calcitic or dolomitic limestone. Seventy-five per cent or more should pass a 100-mesh sieve and it should contain not less than 90% of calcium and magnesium carbonates equivalent to not less than 45% of the mixed oxides of calcium and magnesium.

Ground Shell Lime.—The product obtained by grinding the shells of mollusks. Seventy-five per cent or more should pass a 100-mesh sieve and it should contain not less than 80% calcium and magnesium carbonates, equivalent to not less than 40% of the mixed oxides of calcium and magnesium.

Marl, Ground Shell Marl.—The product obtained by grinding natural deposits of shell marl. Seventy-five per cent or more should pass a 100-mesh sieve and it should contain not less than 80% calcium and magnesium carbonates, equivalent to not less than 40% of the mixed oxides of calcium and magnesium.

Waste Lime, Byproduct Lime.—Any industrial waste or byproduct containing calcium or calcium and magnesium in forms that will neutralize acids. It may be designated by the prefixation of the name of the industry or process by which it is produced; *i.e.*, gas-house lime, tanners' lime, acetylene lime waste, lime-kiln ashes, lime silicate, etc.

Calcium Sulphate, Gypsum or Land Plaster.—A product consisting chiefly of calcium sulphate. It is accompanied by varying quantities of impurities and contains about 20% of combined water. It does not neutralize acids.

The original definition of lime, which has been standing since 195, was as follows:

Interpretation of the Word "Lime" as Applied to Fertilizers.—The term "lime" shall not be used in the registration labeling or guaranteeing of fertilizers or fertilizer materials, unless the lime is in a form to neutralize soil acidity, such as the oxide, hydroxide, or carbonate, or equivalent magnesia compounds.

Weston and Brooker Complete New Crushing Plant in Georgia

UNDER THE supervision of W. B. Jamison, the Weston & Brooker Co., Columbia, S. C., with which the Southern Crushed Stone and Granite Co. is affiliated, has about completed the opening of a large granite quarry near Camak, Ga. The new plant will be ready for operation about the middle of this month. The Kiwanis club of Warrenton, a nearby town, is planning to give a big public barbecue by way of celebrating the opening of the large, modernly equipped quarry. Mr. Jamison has been very successful and has had many years of experience in managing plants. Therefore you can safely wager a good sum that the Camak quarry is one of the best in the state of Georgia. It is more than double the size of the Parkhill quarry.—*Edgefield* (S. C.) *Advertiser.*

Gypsum and Gypsum Products Manufacture—Part VI

Heating and Softening of Plaster During Hydration and Setting; Summary of the Properties of Various Stuccos

By S. G. McAnally

Chief Chemist, Giant Portland Cement Co., Egypt, Penn.; formerly Chemist for the Pacific Portland Cement Co., Mound House, Nev., and Chemist and Superintendent for the Standard Gypsum Co., Ludwig, Nev.

ALL CALCINED GYPSUM plasters (not completely dehydrated) heat and soften temporarily after setting, some to a lesser extent than others, but nevertheless these defects are present. Heating precedes softening.

Freshly calcined double-boil plaster, in addition to heating after it sets, heats at once when mixed with water. This first heat is due to the reversion of soluble anhydrite ($CaSO_4$) to the hemi-hydrate ($CaSO_4 \cdot \frac{1}{2}H_2O$).

Generally, plaster begins to heat as soon as the material has set, but the time interval between the end of the set and the maximum rise in temperature seems to vary with the length of the setting time, as also does the duration of the temperature rise.

The heat developed in the set plaster is probably due to the ultimate reversion of the hemi-hydrate to raw gypsum. The quantity of heat given off by freshly calcined set plasters having the same composition (per cent. of hemi-hydrate) will be about the same for such plasters, and will be a product of duration and average rise in temperature; the higher the average rise, the shorter will be the duration of the heating period.

The maximum rise in temperature is influenced by the length of setting time, impurities in the plaster, rapid cooling, aging, and by the temperature of the surrounding atmosphere; if the temperature of the latter is higher than the initial temperature of the wet mixture, the greater will be the rise.

Normal setting single-boil plaster and "hemi-hydrated" soluble anhydrite (double-boil) do not heat excessively. But if the set is accelerated, due to any cause, the rise will be considerable. This is to be expected. In a given plaster a definite amount of heat is developed after the set; the more rapid the set the more rapid will be the other reactions that take place. Therefore if the set is accelerated, the exothermic reaction takes place with greater intensity (higher rise in temperature) due to its duration being shorter; and if the setting time is retarded, the heating of the plaster will take place more slowly and the temperature rise will be less. Indeed, in very slow setting plasters there is no discernible increase in the temperature of the plaster.

Editor's Foreword

THE hydration and setting phenomena of gypsum plasters or stuccos are derived, based on original tests and investigations, with some suggestive comment on the reasons. As this is a subject but little understood as yet, all original experimental work is most welcome. It is hoped that the author's work will be commented on by others who have explored this same field.

Plasters which contain a considerable amount of inert impurities develop less heat than the purer plasters. Other impurities, which act either as retarders or as accelerators, affect the heating according to their influence on the setting time.

Plaster that has been cooled rapidly will show a lower rise in temperature, after setting, than a slow-cooled plaster. Aged plaster has the least rise in temperature; this is not due to any appreciable lengthening of the set. Evidently the phenomenon of aging is accompanied by a liberation of some heat, and therefore less heat is generated after the aged plaster sets.

The maximum temperature of the set plaster depends on the maximum rise and on the temperature of the wet mixture, or casting, just before the latter sets. At this period, fresh double-boil plaster attains a higher temperature than other plasters. The first heat developed, when the former is mixed with water, is sufficient to keep the temperature of the wet mixture above normal until the plaster sets, and the subsequent rise in temperature raises the maximum sufficiently high so that it will melt the particular kind of glue that is used in the manufacture of ornamental plaster casting molds. When double-boil plaster becomes aged or absorbs moisture so that the soluble anhydrite reverts to the hemi-hydrate, the first heat does not occur, and the maximum rise in temperature of the set plaster is much lower. Fig. 7 shows the heat curves of freshly calcined and of aged double-boil, before and after the set.

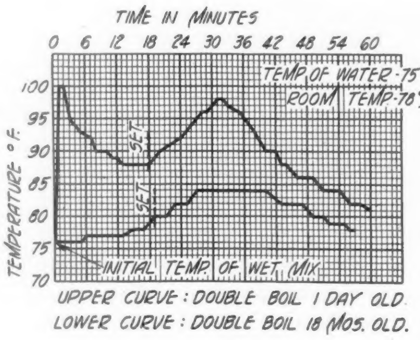


Fig. 7. Heat curves of freshly calcined and of aged double-boil, before and after the set

Less double-boil plaster is made today than formerly. For the manufacture of casting, molding and finishing plasters, the use of aged single-boil stucco is becoming more general. The latter attains greater early strength and hardness, and heats less than the usual plasters. However, if it is not excessive, heating may be beneficial in aiding the hardening of the plaster and evaporating the excess water.

Setting Phenomena

Softening occurs after the heat reaction is completed. Some plasters become quite hard after they set, especially if the heat developed is considerable, and they may be harder, temporarily, than a superior quick-hardening plaster, but when the exothermic heat has been dissipated, the plasters begin to soften and take on a damp appearance and lose strength. Later they become hard when the excess water, used for mixing, has evaporated. This softening can be duplicated by immersing in water, for a few minutes, a plaster that has attained its ultimate strength.

Plasters having a high water ratio or which have been mixed with a quantity of water greatly in excess of the theoretical amount required to convert them to raw gypsum ($CaSO_4 \cdot 2H_2O$) tend to soften most. Freshly calcined single-boil stucco softens more than double-boil. The latter usually shows a progression between the 45 minutes and the 2 hours tensile strength; the former shows retrogression. Double-boil calcined gypsum has a lower water ratio than single-boil, and, as the former contains less residual water of hydration, it requires a larger per-

TABLE XVI SHOWING EFFECTS OF WATER IMMERSION ON TENSILE STRENGTH OF SET FIBERED PLASTER

			Tensile strength, lb. per sq. in.			
	Mixture	Water used	1 day in air	14 days in air	28 days in air	14 days air and 14 days in water
Brand A	1 plaster, 3 std. sand	14.0%	96	351	362	50
Brand B	1 plaster, 3 std. sand	9.2%	153	460	477	87

centage to convert it to raw gypsum; therefore the excess of mixing water will be less in the double-boil than in the single-boil. The following example will make this clearer. The percentage of mixing water required for two plasters, one single-boil and the other double-boil, made from pure gypsum, was 80 and 65, respectively. Now the single-boil required, approximately, 19% water to convert it to raw gypsum, and the double-boil, approximately, 26%. Therefore the excess water in the single boil was 61%, and in the double-boil, 39%.

Aged plasters soften least and quickly regain their hardness.

The period at which plasters begin to soften depends on the length of the setting time. With quick-setting plasters (40 minutes or less) softening may occur within ½ hour to 1½ hours. The duration of the softening period will vary with the setting time and the excess of mixing water used. Some slow-setting plasters are soft after 24 hours, especially if the humidity of the atmosphere is high.

The phenomenon of softening is difficult to explain. It may occur at the same time as expansion, and both may be due to the change from $CaSO_4 \cdot 1\frac{1}{2}H_2O$ to $CaSO_4 \cdot 2H_2O$. In a previous article it was shown that the product corresponding to the former was denser than the latter, and it was assumed that the above stage of hydration may be accompanied by an expansion of the set plaster. This expansion, if it does take place at this time, would weaken the plaster (softening), and if there was a large excess of water, the mass would offer less resistance to the expansive forces.

Some plasters, when mixed with water, tend to settle out from the water, or in other words the plastic mixture exudes water. This is more likely to occur with aged plaster and is detrimental at all times and especially if the material is used for castings or moldings. A suggested remedy is to regrind the plaster; the addition of a filler, such as diatomaceous earth, may prevent settling.

Calcined gypsum has hydraulic properties, i.e., it will set under water, but as evaporation of the excess mixing water is essential for attaining strength, plaster briquettes immersed in water remain comparatively soft, and eventually the set plaster (raw gypsum) is dissolved in the storage water. Plaster of paris, which had a setting time of 20 minutes in air, was mixed with sufficient water to make a thick creamy mixture, and the latter was immersed in water at normal temperature and tested for setting time. The immersed plaster set is 28 minutes.

Tensile strength tests were made on two brands of fibered hardwall to determine the effects of water immersion, after the plasters had attained almost maximum strength in air. The results are shown in Table 16.

The following tables, which cover some of the minor properties of raw and calcined gypsum, complete the part of the series describing the properties of calcined gypsum.

TABLE SHOWING PROPERTIES OF CALCINED GYPSUM

Specific Gravity

Material	Sp. Gr.
Raw gypsum	2.35
Single-boil stucco	2.44
Double-boil stucco	2.57
Aged stucco	2.62
Keene's cement	2.80
Anhydrite	2.88

Specific Heat

Material	Determination at deg. F.	Sp. Ht.
Raw gypsum	120	0.244
Double-boil	335	0.167
Double-boil	365	0.159

Volumes and Voids

Material	Volume per 100 grams	Voids in 100 grams
Solid gypsum	41.2 c.c.	nil.
Set Keene's cement plaster	50.6 c.c.	7.0 c.c.
Set single-boil plaster	81.1 c.c.	26.6 c.c.
Set single-boil aged plaster	69.2 c.c.	14.7 c.c.

(To be continued)

Paper-Mill Lime Sludge Sold to Farmers at 50c Per Ton

DESPITE RUMORS to the contrary, lime is still available in large quantities at the Northwest Paper mill at Cloquet, Minn., says the *Carlton* (Minn.) *Vidette*, which continues: It had been rumored that the mill was reusing the sludge and that none of it would be sold after October 1. According to George McGregor, in charge of the mill laboratory, there are thousands of tons of this material available and there will be for some time to come.

Lime sludge analyzes 98% carbonate, which is exceptionally high. At the extremely low price at which this lime can be purchased there is not a farm in Carlton county where it could not be used profitably. According to the Canadian farmers who toured Carlton county in June, the price of limestone in the Port Arthur vicinity is $10 per ton and yet farmers are using a great deal of it. Certainly if Canadian farmers can pay $10 per ton for limestone which is not of as good quality as the Cloquet sludge, Carlton county farmers can afford to pay 50 cents per ton for the sludge.

New Johnstown, Penn., Silica Quarry Enterprise

ONE of the latest industrial plants added to Johnstown's (Penn.) many industries is that of the Conemaugh Quarries, Inc., which is owned and controlled by local capital and also using local labor. A number of Johnstown's leading business men are interested in the new industrial enterprise. The new firm is incorporated under the laws of Pennsylvania and has a capital stock of $50,000. The plant is now in operation and employs 15 men.

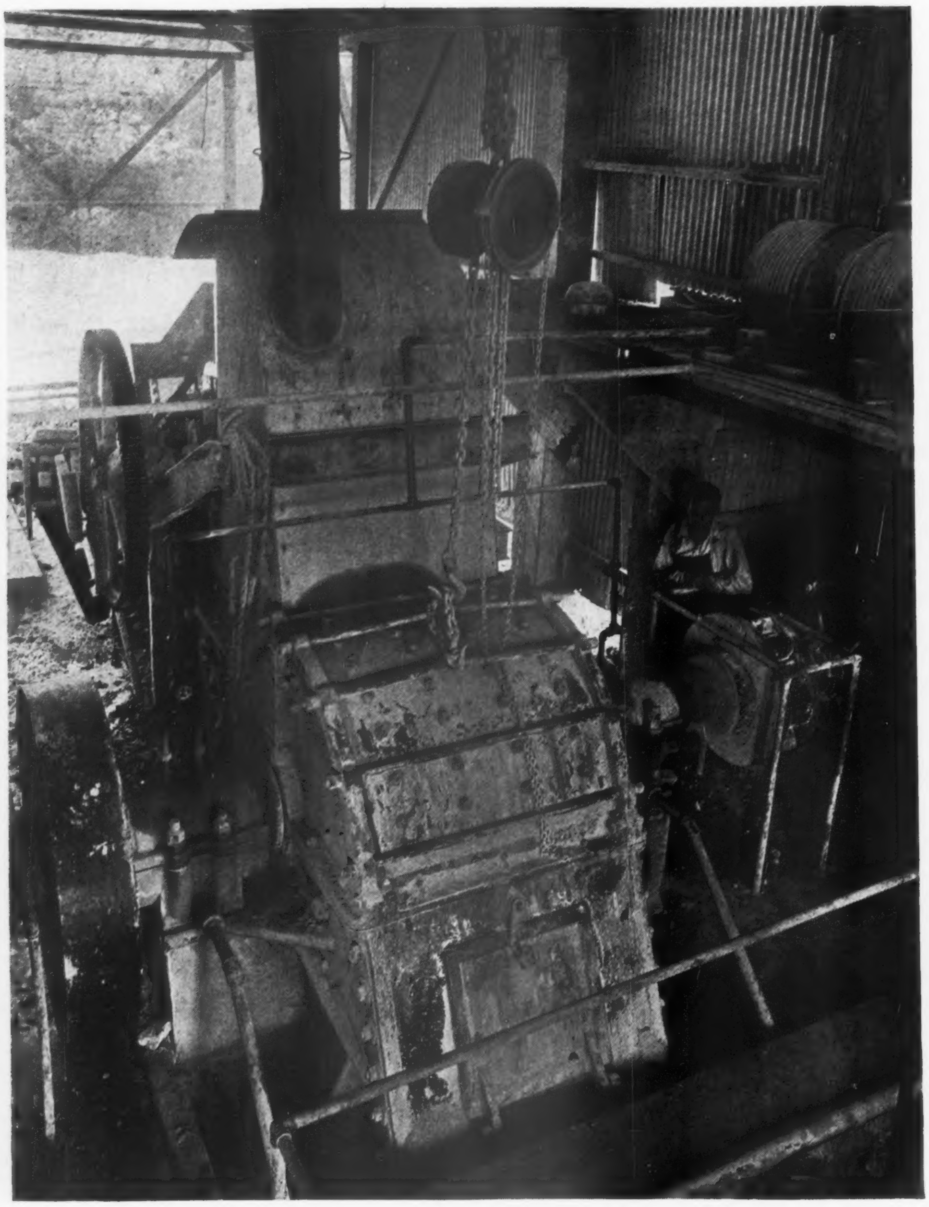
The stockholders of the Conemaugh Quarries, Inc., are: John H. Waters, David Barry, John W. Walters, W. Y. Boyd, P. S. Fisher, Robert McEldowney, George Jordan, Carl E. Resley, Alfred Slater, Attorney H. S. Endsley, Charles Griffith and Attorney Harry B. Mainhart, all of Johnstown, and Attorney Fred W. Biesecker, of Somerset. The officers of the company are: President, Attorney Mainhart; vice-president, Alfred Slater; secretary-treasurer, Attorney Endsley. The company's offices are in the First National Bank building.

The operations of the Conemaugh Quarries, Inc., are located along the Haws pike, a few miles west of the city limits. Installation of the plant, which is now modernly equipped in every respect, was started last May, and provided employment for 15 to 25 men. The company has abided by the decision of President Hoover not to reduce wages. The principal product of the new industrial plant is an excellent white, washed sand, which is suitable for all purposes. E. T. Gray, a member of the local engineering firm of Gray and Claflin, is the engineer.

Every step in the development of the project was carefully considered. There is an abundant water supply for washing sand and manufacturing purposes. The sloping ground makes gravity handling practicable and the vast basic bed of flint clay known to underlie the sandstone area affords another very profitable asset to clay manufacture.

An unusual feature relating to the title of the property, consisting of 374 acres, is that in 1918 it was owned by the Deutsche Bank of Berlin, Germany, and in June, 1918, the property was taken over by the alien property custodian under the provisions of the Act of Congress known as the "Trading With the Enemy Act" and the executive orders and proclamations issued pursuant thereto.

H. S. Kerbaugh, Inc., first developed the property, which is situated in St. Clair township, Westmoreland county, along the Pennsylvania railroad main line and the Conemaugh river. Tests established that the sandstone is ideal for crushing and the sand is admirably adapted for use as an abrasive in the manufacture of plate glass, for concrete manufacture and for many other commercial purposes.—*Johnstown* (Penn.) *Tribune*.



This one hammer crusher does all the crushing

By
Ray F. Schneider

Young Men Build One-Crusher Stone Plant

Bussen Quarries, Inc., New Plant at Jefferson Barracks, Mo.

"A STRICTLY MODERN crushing plant built and operated by young men" probably would be the best brief description of the new plant of Bussen Quarries, Inc., of Jefferson Barracks, Mo. Situated just 15 miles from the heart of St. Louis, and with an almost inexhaustible supply of raw material available, this plant is in excellent position to supply a considerable percentage of the future crushed stone tonnage of this district.

A 50-Year Background

Production of crushed rock on the present relatively large scale is a new venture for the company, although the name Bussen has been identified with the quarry industry in the St. Louis territory since 1881, at which time the late Albert Bussen, Sr., began the production of rip-rap stone. Rip-rap is a much used material by government engineers throughout the Mississippi valley in curbing the wandering tendencies of the river and many an acre of rich bottom land along the 100 miles of Mississippi just south of St. Louis owes its present status to stone produced in the Bussen quarries.

Besides the original quarry three more have been opened along the river at strategic intervals between St. Louis and Ste. Genevieve, about 70 miles south, the limestone bluffs forming the source of raw material. Each is in close proximity to the river loading on barges.

The three southernmost quarries are devoted exclusively to the production of rip-rap while the fourth which is nearest St. Louis contains the crushing plant which this article is to describe.

Since the elder Mr. Bussen's death several years ago, the business has been ably carried on by four sons, who, although in their early thirties or younger, have shown a knowledge of the stone business far beyond their years.

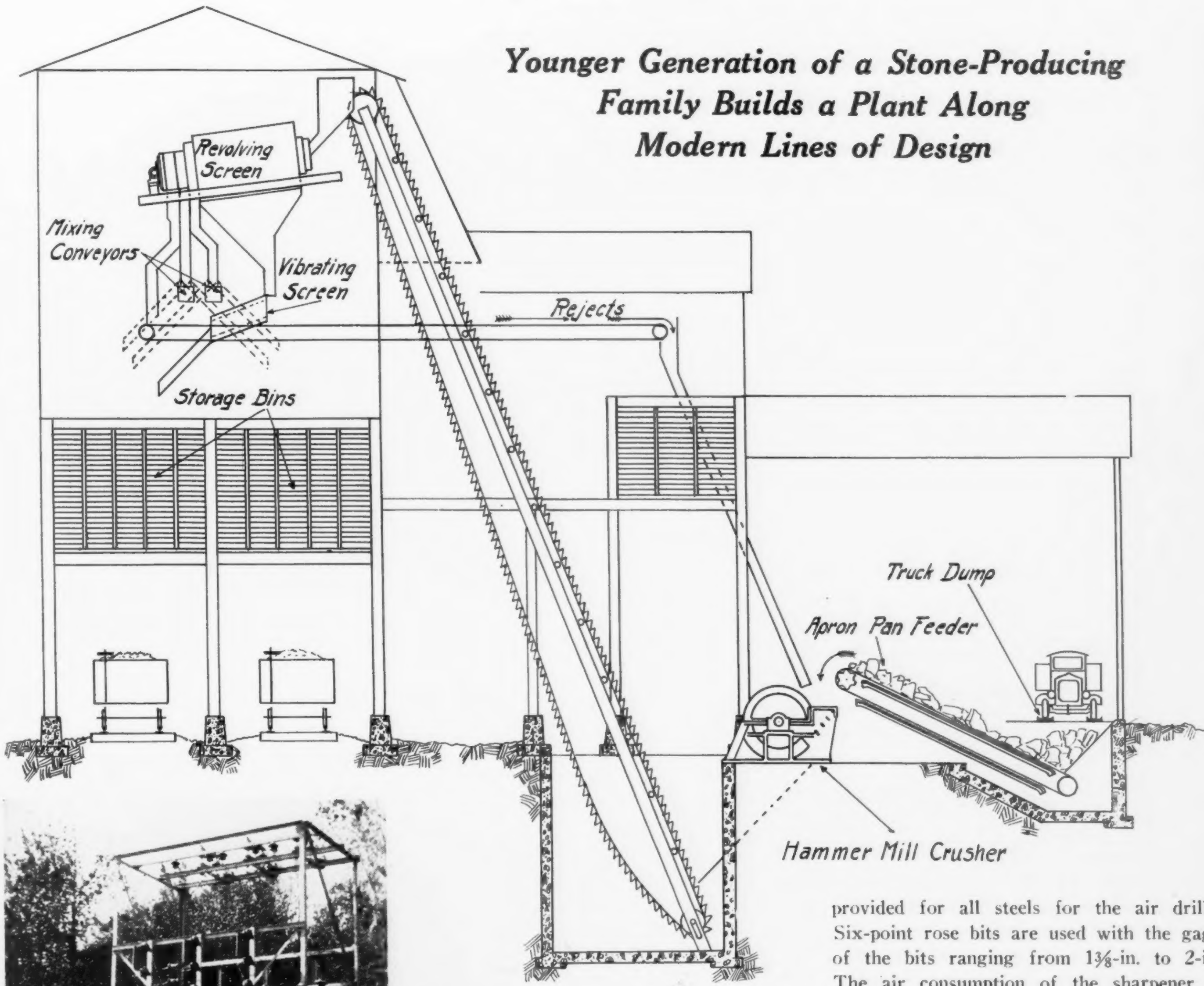
The Mine

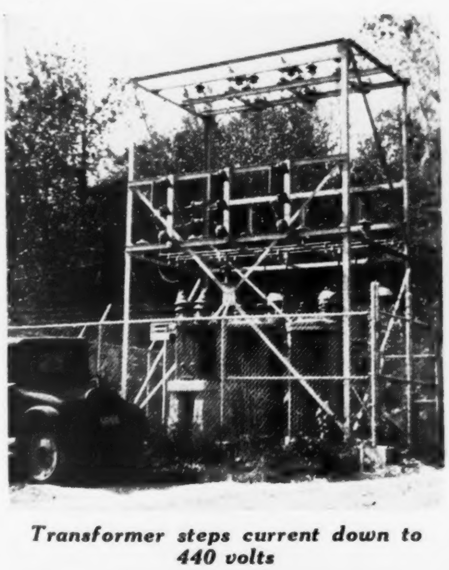
Erection of the crushing plant was started about two years ago, and it embodies a number of features which are of more than casual interest. Raw material is now being taken from a limestone bluff showing about a 60-ft. face of rock above the quarry floor, and there is also an inexhaustible supply of rock below the present floor, which can be worked whenever necessary.

The rock is a quite hard limestone and is free from clay and earth.

From 10 to 30 ft. of overburden would have to be moved from the present face, and for this reason tunneling was decided upon. Four of the tunnels are driven in a westerly direction into the bluff and away from the river. The fifth extends southward paralleling the river, and it is eventually intended to open up another quarry one quarter mile away, where a fine face of rock is exposed with very little overburden. This will be worked as an open-pit operation. In this way the open pit will be

Younger Generation of a Stone-Producing Family Builds a Plant Along Modern Lines of Design





Transformer steps current down to 440 volts

available in fair weather and the mine can be worked during cold or wet weather.

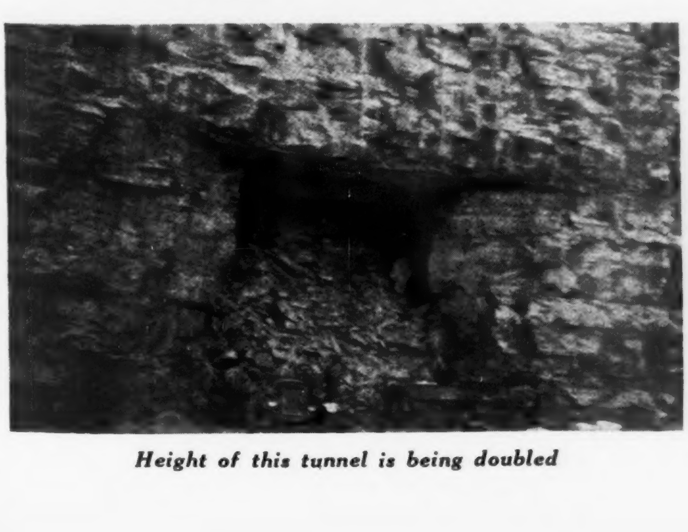
Drilling

The rock is drilled with Gardner-Denver drifters, the air being supplied by a Sullivan Machinery Co. 14- x 8¾- x 10-in. "Class WJ3," angle-compound air compressor, with a capacity of 637 cu. ft. per min. The compressor is belt-driven from a 100-hp. General Electric motor.

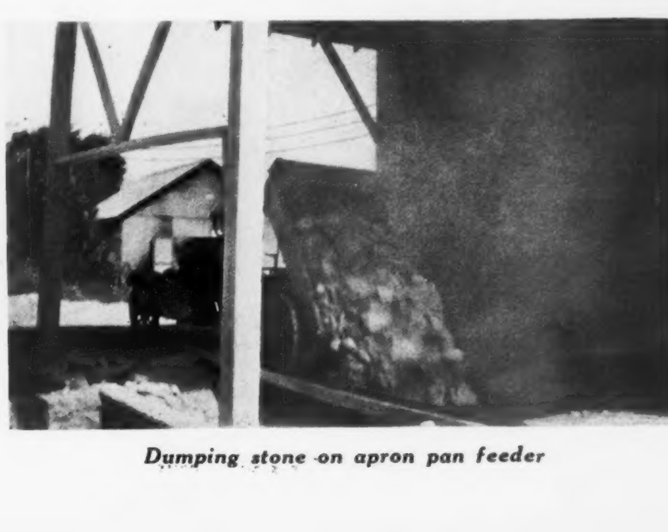
A Sullivan "Class C" drill sharpener is provided for all steels for the air drills. Six-point rose bits are used with the gage of the bits ranging from 1⅜-in. to 2-in. The air consumption of the sharpener is very low, averaging 54 cu. ft. per min. while making shanks, 44 cu. ft. in making new bits and 30 cu. ft. when resharpening bits. Bits are made from bar stock in one minute or less. Steels are heated in a Sullivan, drill-steel, oil furnace having a capacity of 10 to 13 bits.

Blasting and Loading

Four to eight holes are shot at a time using Trojan 40% dynamite, Trojan caps and Ensign-Bickford "Clover" brand fuse.



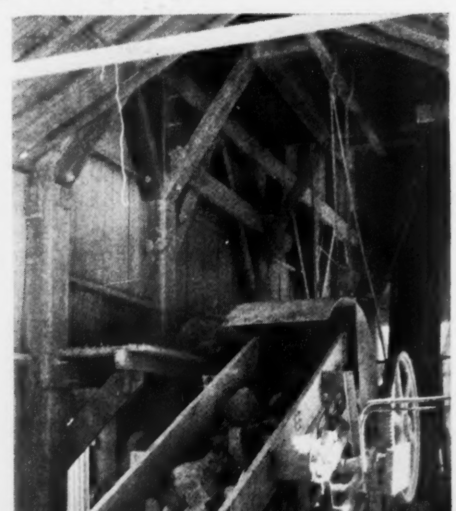
Height of this tunnel is being doubled



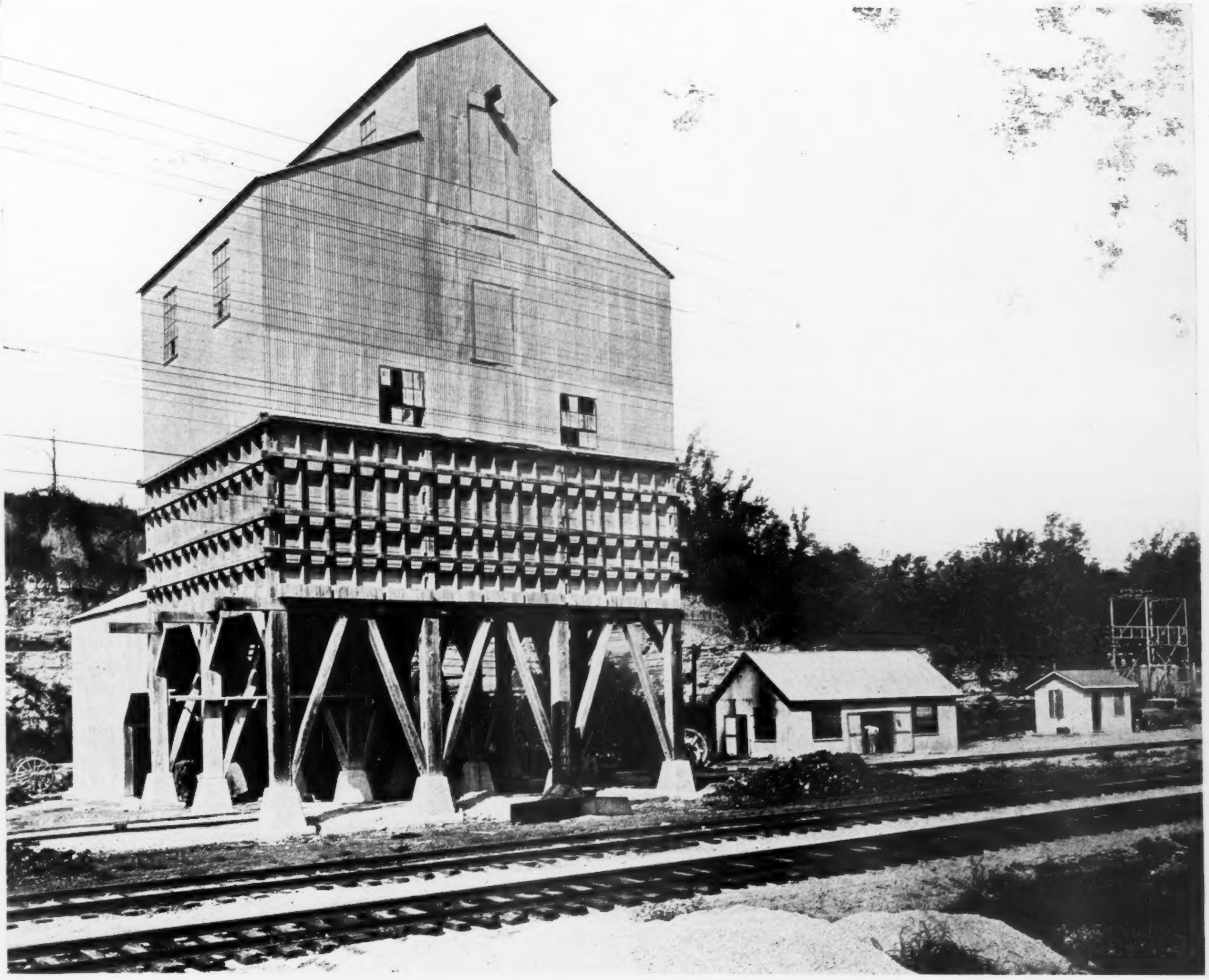
Dumping stone on apron pan feeder

This is a continuation of illustration on opposite page, showing tunnel openings

Rock of this size is crushed to 2 in.



Apron pan feeder



Crushing plant and forge shop of Bussen Quarries, Inc., Jefferson Barracks, Mo.

Electrical firing is also frequently used. The owners estimate a cost of 5c per ton for shooting in the tunnel operations.

The stone is now hand loaded, although this method is proving expensive and it is planned to install a 1 or 1¼-yd. power shovel in the near future. Trucks carry the rock to the crusher; 15 Fords of 1¾ tons capacity with gravity dump, 3 Whites and one Republic, each of 5-yd. capacity, comprise the fleet. Just as soon as mechanical loading is installed the present motor-truck fleet will be re-vamped.

The trucks as they arrive at the crushing plant travel across channel-iron tracks and dump into a pit, from which a 36-in. wide by 24-ft. long Stephens-Adamson apron pan feeder delivers the rock in a uniform stream to the crusher. This feeder is driven through a Stephens-Adamson speed reducer by a 10-hp. General Electric motor, equipped with push-button control, so that the feeder can be quickly stopped and started.

Crushing Plant

The entire crushing equipment consists of one No. 6 "Super-Jumbo" Williams hammer

Both large and small trucks are used in the tunnels

Note the excellent tunnel roof

One of the drifter type drills

crusher. It takes rock as large as 36-in. and reduces to 2-in. in one reduction. This crusher was installed with an eye to future mechanical loading. However, its ability to handle large rock has proved most economical even with hand loading, for large rock, which lies high enough to be conveniently rolled upon the trucks, can be handled by the crusher with practically no sledging or secondary drilling and shooting.

The feed opening of the crusher is 36-in. by 42-in., large enough to handle any size stone loaded with a 1-yd. dipper. It is direct-connected by flexible coupling to a 150-hp. 720-r.p.m. Fairbanks-Morse, slip-ring motor, and with this power has handled rock at the rate of 200 tons per hour when set to make 2-in. However, 100 tons per hour is considered the normal output of the plant. The principal demand is for ¾-in. to 2½-in. rock and by careful adjustment of the hammer crusher, "fines" have been held to a very low figure.

Crushed material is elevated by a 77-ft., centers, Stephens-Adamson bucket elevator to a Stephens-Adamson revolving screen, which makes four separations. A belt conveyor returns the rejects to the Williams crusher, while the minus ¾-in. product goes to a 3-ft. by 6-ft. Stephens-Adamson vibrating screen.

One 30-hp. General Electric motor drives the elevator and revolving screen, while another smaller motor runs the vibrating screen.

An interesting and useful feature of the plant are the mixing conveyors furnished by Stephens-Adamson, which permit mixing the various sizes as they come from the screen, so that almost any desired combination can be furnished on demand.

Six storage bins substantially built of timbers are available. Each bin has an inside measurement of 14 ft. by 16 ft. by 14 ft. high, and is so arranged as to discharge by gravity into railroad cars or trucks. All buildings are of heavy timber construction covered with corrugated galvanized iron.

The president of Bussen Quarries, Inc., is Eugene A. Bussen; vice-president, Charles Bussen; secretary, Sylvester Bussen; treasurer, general manager and purchasing agent, Al. J. Bussen.

Developments in the Mining Industry

SOME of the many developments and improvements in the mining industry during recent years were brought out in an address by Scott Turner, director of the U. S. Bureau of Mines, at Lafayette College, April, 1930, and published by the Bureau of Information Circular No. 6374, October, 1930.

While these changes have come gradually but at a constantly increasing rate, it is pointed out that we may expect in the future an even more rapid development and change.

In the metallic field mining methods have been so greatly improved that such outputs as 17 tons per man-shift in one Arizona copper mine, 28 tons in another Arizona open-pit copper mine, and 47 tons per man-shift at an Alaska gold mine, have been obtained.

In coal mining, production has been increased to 4½ tons per man-shift on bituminous and 2.1 tons on anthracite mining, while at one strip-pit operation the output is 47 tons of coal per man per day. These things have come about through the larger use of electricity for driving machinery and for haulage, the greater use of undercutting and loading machines, rotary car dumpers, etc., and larger unit operations.

Outstanding changes in the metallurgy of copper have been the application of the Bessemer process and those processes involving electrolysis. These electrolytic methods have also been applied to zinc and tin production.

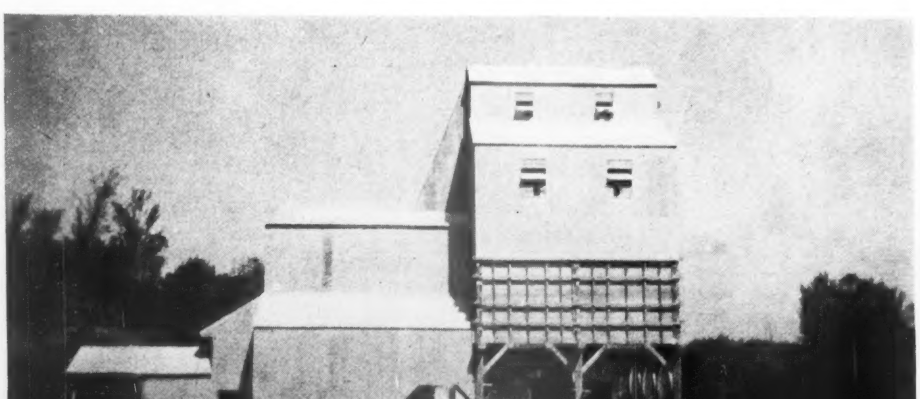
In ferrous metallurgy the many iron alloys have come to have a tremendous industrial importance.

In the non-ferrous field, the various forms of water concentration over tables, vanners, etc., have been largely replaced by the flotation process, which also made usable large tonnages of low-grade deposits.

In the extraction of gold and silver and other precious metals, concentrating and amalgamation have given way to the cyanide process, which has given higher extraction at lower costs.

In the petroleum industry, the cracking process used on heavy oils has largely increased the recovery of gasoline, as has also methods of recovering gasoline from natural gas wells. Rotary drilling has also made available wells which could not have been drilled otherwise because of overlying caving formations.

The safety movement of recent years has also had its part in this progress. Ventilation and health conditions have been given more attention. Rock-dusting, electric blasting, blasting only at the end of the shift, dust prevention by wet drilling and cutting, and other measures of this kind show the great improvements made in conditions.



Another view of the Bussen Quarries plant

Effect of Flat Pieces of Crushed Stone in Concrete Paving

A. T. GOLDBECK, writing in the *Crushed Stone Journal,* says that the requirement of not more than 5% of flat and elongated pieces in aggregate for concrete paving seems not to have been founded on definite experimental data. He gives the result of tests made at the National Crushed Stone Association's laboratory, of which he is engineering director, to determine just what the effects of flat pieces are.

Flats are defined to be those pieces which are five times longer than their average least dimension. An alleged bad effect of such pieces is that they make the finishing of concrete difficult. Also it has been thought that they make for high voids, requiring a higher water content for the same consistency, and that they may lead to the formation of holes from the breaking of thin pieces by traffic. His experiments show that such conclusions as these are not justified.

Three Gradings of Stone

Three gradings of the stone, a fine grained gneiss, were made into concrete with Potomac river sand. The first was straight line grading, the second the stone as received and the third a gradation which had about half as much passing ¾-in. as the others, a coarse grading. Slabs 3 ft. by 6 ft. were cast and finished as nearly in the way a pavement is finished as is possible in the laboratory. The mold was divided by partitions so that the slabs could be broken into beams for the strength tests. Photographs of the finishing at different stages were taken and are reproduced in the article.

The mixes were 1:2:4 with 10% of lime, which was added because it was required with a specification for which the stone was being investigated, and 1:2:3½ without lime. Flat pieces were substituted for cubical pieces in some specimens so that these contained 0, 5%, 5.5%, 10% and 15% of flats. The cement content was constant for all 1:2:4 mixes, and for all 1:2:3½ mixes, and the water content was constant for mixes of the same kind. Hence only the effect of flats and of variations in gradation remained to be tested. Strength tests were by breaking the beams with a center load on a 20-in. span.

With the straight-line graded stone the voids were 47.2% with 0 flats, 47.6% with 5% flats, and 48.6% with 10% flats, showing that the flats slightly increased the voids. But the poorly graded stone had 51.5% voids, showing a much greater effect on voids from poor grading than that from the presence of flats. The ratio of mortar volume to voids was 1.34 with no flats and 1.30 with 10% flats. With the poorly graded aggregate it was 1.22 in one case and 1.15 in another.

The concrete made with the well graded aggregates, which had an abundance of mortar, finished easily and well; but on the other hand, the concrete made from poorly graded aggregate was hard to finish. Excess stone unsurrounded with motar piled up in front of the screen.

The conclusion is reached that the factors affecting finishing may be poor gradation of stone, segregation of well graded stone and insufficient weight of sand due to bulking. These all make for a low ratio of mortar volume to voids.

In the mixes which had sufficient mortar flats caused no trouble in finishing, so it is concluded that aggregates containing flats cause no trouble in finishing if the same aggregate with the flats removed produces concrete that finishes without difficulty. Voids are not sufficiently increased by the presence of flats to require a change in the water ratio; changes in gradation have a far greater effect. The 1:2:3½ mixes were more workable than the 1:2:4 mixes and have a far greater factor of safety against changes in the aggregates.

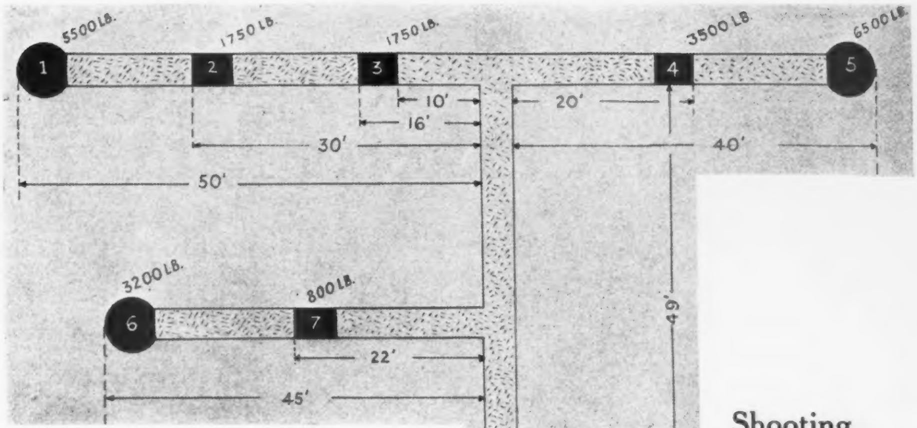
The results of the strength tests on beams are very thoroughly tabulated in the article. They show no consistent effect on the strength from the presence of flats. In fact the highest modulus of rupture was obtained with 10% of flats, although the lowest in the same series was with 15% of flats. However, the differences were too slight to be ascribed to flats in any way. The average for the 1:2:4 mixes was 760 lb. and the range from 740 to 770 lb. For the 1:2:3½ mixes the average was 810 lb., the range being from 790 to 840 lb.

The article notes that the average strengths were in almost the same relation as the cement per cubic yard content.

Sawing through the beams showed that the flats did not lie horizontally, but that they lay in all directions and were distributed through the slab. Hence there is little danger that they would cause trouble at the surface of a slab.

Cement in California

IN 1929, California produced 12,794,729 bbl. of cement, valued at $21,038,565, an average of $1.64 as compared with $1.79 in 1928. There are 11 plants.



Shooting Year's Supply of Stone in One Blast

FOR A NUMBER of years it has been the practice of the York Hill Trap Rock Quarry Co., near Meriden, Conn., to blast out each year with a single shot a year's supply of stone.

Because of the columnar formation of the trap rock and the high face at this quarry, tunneling has been selected as the most satisfactory method of shooting, the practice being to drive the tunnel during the winter months and fire the shot in the spring.

In making the 1930 shot the tunnels were driven and later loaded as shown in the accompanying diagram. The tunnels were about 4 ft. high with the pockets at the ends a few feet below grade to permit better packing and concentration of the explosive charge. Previously 60% extra low freezing gelatin was used where there was water, but in the last shot 7 in. by 16 in. Gelamite 1 was used instead, along with Hercomite in 12½-lb. bags where there was no water. The total charge consisted of 13,000 lb. of Hercomite and 10,000 lb. of Gelamite. Loading was done by sliding the boxes of powder along planks on the bottom of the tunnels, and stemming was done with the rock screenings.

Two No. 6 blasting caps were used in each priming cartridge, and two separate circuits were used, so that four caps were used in each of the seven charges. The priming cartridges were placed in the center of each charge, and the circuits were tested frequently with a galvanometer to make sure there were no breaks in the lines. The charges were fired by connecting with a 550-volt line.

Approximately 150,000 tons of rock were broken down by the blast, with a total of 23,000 lb. of explosives, giving a ratio of about 6½ tons of rock per pound of explosive.

The blast was planned and loaded under the supervision of J. Barab and Milo Nice, of the Hercules Powder Co., and was described in detail in a recent issue of the *Explosives Engineer.*

Researches on the Rotary Kiln in Cement Manufacture[1]

Part IX—Determination of the Quantity of Heat Required to Decompose 1 Lb. of Calcium Carbonate at the Temperatures Prevailing in a Cement Rotary Kiln

By Geoffrey Martin

D.Sc. (London and Bristol), Ph.D., F.I.C., F.C.S., M. Inst. Chem. Eng., M. Inst. Struct. Eng., M. Soc. Pub. Analysts, F. Inst. Fuels; Chemical Engineer and Consultant; Former Director of Research of the British Portland Cement Research Association; Author of "Chemical Engineering"

THE HEAT OF DISSOCIATION of calcium carbonate used up to now by the British Portland Cement Research Association in calculating the heat balance of the rotary cement kiln represents the heat of dissociation at ordinary temperatures, being based on the work of Julius Thomsen, Berthelot, Le Chatelier, and de Forcrand.

The particular value taken up to the present is 774 B.t.u. per lb. of calcium carbonate decomposed. However, the particular form of calcium carbonate which occurs in the raw materials used for cement is calcite, and at ordinary temperatures the heat of dissociation of this substance is 42,000 gram-calories per 100 grams of $CaCO_3$ decomposed, or 756 B.t.u. per lb. calcium carbonate used.

The heat of dissociation, however, is a quantity which varies with the temperature.

As the calcium carbonate actually decomposes in the kiln itself at a temperature of 800 deg. to 900 deg. C., it is of considerable interest to examine its value at these temperatures, with a view of ascertaining whether it is possible to obtain a more accurate heat balance than has been possible up to date.

The researches carried out on the magnitude of the dissociation pressures of calcium carbonate at different temperatures by Brill,* Pott,† Zavriet,‡ Riesenfeld,§ and John Johnstone¶ have now given us data whereby it is possible to calculate the heat of dissociation of calcium carbonate at high temperatures.

John Johnstone's determinations of the vapor pressures of the carbon dioxide evolved are the most accurate to date, and have recently been confirmed.|| Johnstone's results will therefore be taken as the basis of our calculations.

It is well known in thermodynamics that the connection between the vapor pressure p (in millimeters of mercury), the absolute temperature T (in centigrade units) and the heat Q absorbed when a weight of 1 gram molecule of material undergoes a chemical change is given by the formula:

$$\frac{d \cdot \log_e p}{dT} = \frac{-Q}{RT^2} \quad . \; . \; . \quad (1)$$

R is the ordinary gas constant, which is equal to 1.985 gram-calories.

Now, from J. Johnstone's results we find that the vapor pressures of the carbon dioxide evolved from dissociating calcium carbonate are given by the equation:

$$\log_{10} p = \frac{-9340}{T} + 1.1 \log_{10} T - 0.0012T + 8.882.$$

$$\text{Hence} \quad \log_e p = \frac{-9340 \times 2.3026}{T} + 1.1 \log_e T - 0.0012 \times 2.3026T + 8.882 \times 2.3026,$$

$$\text{and} \quad \frac{d \log_e p}{dT} = + \frac{21.505}{T^2} + 1.1 \frac{1}{T} - 0.002763 \quad . \; . \; . \quad (2)$$

$$\text{From (1)} \quad Q = -RT^2 \times \frac{d \log_e p}{dT},$$

$$\text{or} \quad Q = 42{,}700 + 2.183T - 0.005485T^2 \quad . \; . \; . \quad (3)$$

From this formula we are enabled to calculate the heat of dissociation of calcium carbonate at any temperature. For example, we have proved that in the calcining zone of a rotary kiln the initial temperature of decomposition of the calcium carbonate is 805 deg. C. = 805 + 273 = 1078 deg. C. absolute, whence T = 1078, substituting in (3)

$$Q_{805^\circ\,C.} = 42{,}700 + 2.183 \times 1078 - 0.005485\,(1078)^2$$

= 38,680 gram-calories per 100 grams of calcium carbonate decomposed

= 696.3 B.t.u. per lb. $CaCO_3$ decomposed.

Farther up the calcining zone, nearer the sintering zone, we proved that the initial temperature of decomposition is 784 deg. C. = 1057 deg. absolute.

Hence

$$Q_{784^\circ\,C.} = 42{,}700 + 2.183 \times 1057 + 0.005485\,(1057)^2$$

= 38,879 gram-calories per 100 grams $CaCO_3$ decomposed

= 699.8 B.t.u. per lb. of $CaCO_3$.

Similarly,

$$Q_{850^\circ\,C.} = 688 \text{ B.t.u. decomposed.}$$

Proceeding in this manner, we have calculated in Table I (columns C and E) the heat of dissociation between − 73 deg. C. and + 3000 deg. C., and the results are plotted in the two curves—Fig. 12, which gives the molecular heat of dissociation, *i.e.*, the heat required to decompose 100 grams of calcium carbonate, and Fig. 13, which gives the same result in B.t.u. per lb. of $CaCO_3$ and in Fahrenheit degrees.

The results shown in column C and E are calculated from J. Johnstone's results (see *Jour. Amer. Chem. Soc.*, 1910, **32**, p. 943) from the dissociation pressures of the evolved carbon dioxide, who in turn assumed that the heat of dissociation of calcium carbonate at 27 deg. C. per gram-molecule (100 grams) is

Q_{27} = 42,900 gram-calories.

This was the mean value of

Editor's Note

LIKE the previous article in this series, this one should be of as much interest to lime manufacturers, particularly operators of rotary kilns, as to portland cement manufacturers.

It discusses how the heat of dissociation of calcium carbonate ($CaCO_3$) varies with the temperature, due to vapor pressures. The physical and mathematical proofs involved are rather complicated, but the table based on the computations is readily understood. It shows that as the temperature rises the actual amount of heat absorbed in the chemical reaction of separating CaO from CO_2 decreases, so that, were it possible to calcine the limestone at very high temperatures, heat would actually be evolved in the reaction instead of absorbed.

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*Brill, *Zeitsch. Anorg. Chem.*, 1905, **45**, 275.

†Pott, Dissertation, "Freiburg in B.," 1905.

‡Zavriet, *Comptes Rendus*, 1907, **145**, 428; *Jour. Chim. Phys.*, 1909, **7**, 31.

§Riesenfeld, *Jour. Chim. Phys.*, 1909, **7**, 561.

¶John Johnstone, *Jour. Amer. Chem. Soc.*, 1910, **32**, 938.

||Pierre Jolibois et Bouvier, *Comptes Rendus*, 1921, **172**, 1182-1183.

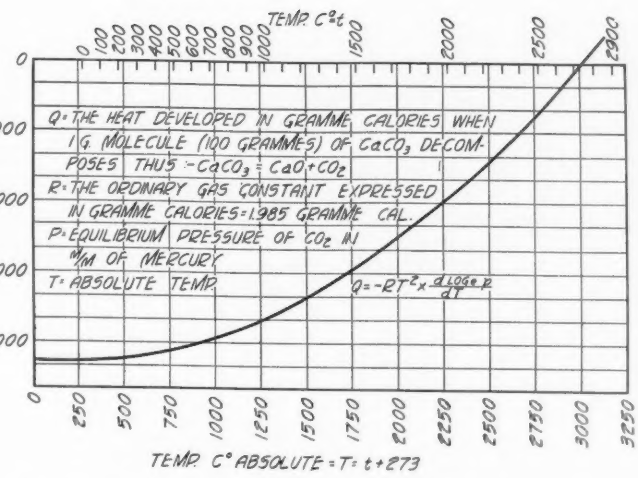


Fig. 12. Heat required to decompose 100 grams of calcium carbonate, in deg. C.

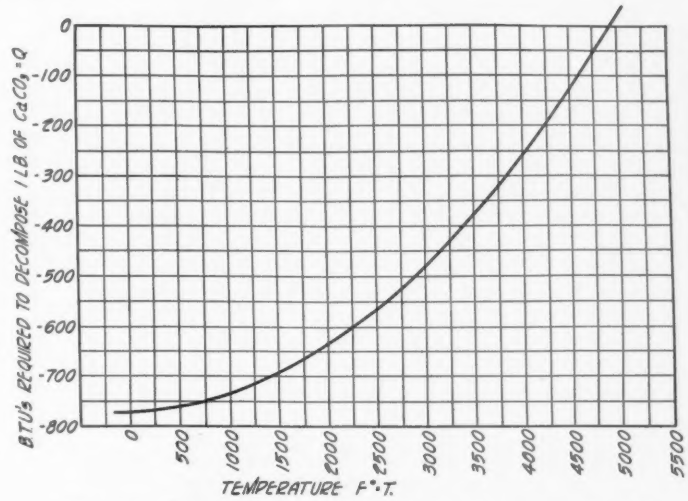


Fig. 13. Same result as Fig. 12, in B.t.u. per lb. of calcium carbonate, in deg. F.

Thomsen and de Forcrand's results for precipitated chalk (42,500 and 43,300 gram-calories respectively), which Johnstone took as the best value of this thermal constant.

However, we know that in the raw materials employed in the manufacture of portland cement the calcium carbonate is mainly in the form of *calcite,* and hence a better value to adopt, for the heat of formation of calcium carbonate is the value of *calcite,* viz., Q_{27} = 42,000 gram-calories per 100 grams $CaCO_3$, this being the value arrived at by de Forcrand (*Comptes Rendus,* 1908, **146**, p. 512) for this material.

For the cement industry, therefore, we should correct the values shown in columns C and E by multiplying by the factors

$$\frac{42,000}{42,900}, \text{ or } \frac{756}{772.2} \ (=0.979).$$

We thus arrive at the results shown in columns D and F.

Extrapolation of Results

The formula:

$Q = 42,700 + 2.183T + 0.0054857T^2$ . . (3)

has been derived from experimental data obtained at temperatures ranging from 18 deg. to 894 deg. C., and consequently can only be considered as correct between these two temperature limits.

Nevertheless, the results obtained by extrapolation outside those limits are interesting, in order to see how the heat of decomposition of calcium carbonate alters with the temperature.

From the curves (and using Johnstone's value of Q_{27} = 42,900 gram-calories) it will be seen that at ordinary temperatures (27 deg. C.) the heat of decomposition is —772.6 B.t.u. (*i.e.,* heat is *absorbed* in decomposing the $CaCO_3$ into CaO and CO_2) but that this quantity steadily becomes *less* as the temperature increases, until at about 2726 deg. C. the value is *zero.* At temperatures *above* that, the heat of formation becomes + *ve, i.e.,* the compound evolves heat on decomposition—which at 3000 deg. C. is + 159. If capable of existing under an enormous pressure at 3000 deg. C., $CaCO_3$ would therefore *evolve* heat on decomposing and would therefore be in the same state as explosives like nitroglycerine are in at ordinary temperatures.

If we could practically heat the calcium carbonate in a confined space to about 2726 deg. C., we could separate from it at this temperature all the carbon dioxide without absorbing any heat.

Practically it would be impossible to do this because of the enormous pressure which would be required to keep the $CaCO_3$ from splitting up to CaO and CO_2 *before* the critical temperature of 2726 deg. C. was reached.

(To be continued)

TABLE I—HEAT OF DISSOCIATION OF CALCIUM CARBONATE ($CaCO_3$) AT DIFFERENT TEMPERATURES

Temperature, deg.		Heat of dissociation for 1 gram-molecule (100 grams) of $CaCO_3$		B.t.u. required to decompose 1 lb. of $CaCO_3$		Remarks
		For precipitated chalk based on J. Johnstone's value 42,900 gram-calories at 27 deg. C.*	For calcite based on de Forcrand's value 42,000 gram-calories at 27 deg. C.†	For precipitated chalk based on J. Johnstone's value 42,900 gram-calories at 27 deg. C.*	For calcite based on de Forcrand's value 42,000 gram-calories at 27 deg. C.†	
A	B	C	D‡	E	F‡	
Deg. C.	Deg. F.	Gram-Calories	Gram-Calories	B.t.u.	B.t.u.	
— 73	— 109.4	—42,917	—42,015	—772.6	—756.40	
+ 27	+ 80.6	—42,900	—42,000	—772.2	—755.98	
+ 100	+ 212	—42,751	—41,853	—769.5	—753.3	
+ 200	+ 392	—42,506	—41,613	—765.2	—749.1	
+ 300	+ 572	—42,151	—41,266	—758.6	—742.6	
+ 400	+ 752	—41,687	—40,811	—750.4	—734.6	
+ 500	+ 932	—41,113	—40,249	—740.0	—724.5	
+ 600	+ 1,112	—40,429	—39,580	—729.8	—714.5	
+ 700	+ 1,292	—39,636	—38,803	—713.5	—698.5	
+ 784	**+ 1,443**	**—38,879**	**—38,062**	**—699.8**	**—685.1**	Lower limit of initial decomposition in rotary kiln.
+ 800	+ 1,472	—38,733	—37,919	—697.2	—682.5	
+ 805	**+ 1,481**	**—38,680**	**—37,868**	**—696.3**	**—681.6**	Upper limit of initial decomposition in rotary kiln.
+ 900	+ 1,652	—37,720	—36,928	—679.0	—664.7	
+1,000	+ 1,832	—36,598	—35,829	—658.0	—644.2	
+2,000	+ 3,632	—19,349	—18,942	—348.4	—341.1	
+2,727	**+ 4,940**	**+ 71**	**+ 69.5**	**+ 1.28**	**+ 1.25**	At this temperature practically no heat is required to decompose the $CaCO_3$. Notice change from — to +.
+3,000	+ 5,432	+ 8,859.7	+ 8,673	+ 159.5	+ 156.1	

**J. Johnstone, Jour. Amer. Chem. Soc.,* 1910, 32, p. 943.
†*De Forcrand, Comptes Rendus,* 1908, **146**, p. 512.

‡In the cement industry nearly all the raw material is in the form of *calcite.* Hence the results of columns D and F are the values of practical importance.

THE LONE STAR CEMENT CO., Texas, Dallas, Tex., is planning expansion and improvements at its Houston mill, including modernizing of considerable equipment and installation of new machinery, to cost over $75,000. The company is completing a similar program at Dallas mill. The Houston mill improvements, it is said, include two 374-ft. kilns, similar to the one being installed at the New Orleans plant of the Lone Star Cement Co., Louisiana.

Colorado Feldspar Grinding Plant

Western Feldspar Milling Co. Uses Special Method to Overcome Unusual Cohesive Properties of Raw Materials

By Joseph C. Coyle
Denver, Colo.

THE DIFFICULTY of milling a first-class product from western feldspar, for the use of porcelain, pottery, enamel, tile and glass manufacturers, is well known to the trade. After forty years of costly experimenting, by various firms, to devise methods of doing this the Western Feldspar Milling Co., Denver, Colo., has been successfully operating now for a year and a half. To produce a pulverized spar suitable for all these purposes a blend from several western

J. W. Magnuson, president, has devoted many years to the industry and is well known in mineral circles

quarries was necessary. The principal difficulty in milling the rock, however, was an excessive amount of static magnetism or cohesiveness which clogged up the mills and prevented proper grinding. A secret apparatus, designed by J. W. Magnuson, president of the Western Feldspar Co., after much experimentation, has solved the problem for this company.

Plant of the Western Feldspar Milling Co., Denver, Colo.

Spar is shipped in from several deposits in Colorado. Several acres of land are owned by the company at the mill site, and there is 800 ft. of railroad trackage at the plant, adapted to both standard and narrow-gage cars, so as to handle rolling stock of any of the tributary railroads. The capacity of the mill is fifty 45-ton cars per month when running three shifts. Three men are required to a shift. With a slight addition to the present equipment it is expected later to increase the capacity of the plant to four 45-ton cars every 16 hours. Practically the only hand labor now involved is in unloading the railroad cars, and this is to be eliminated later by the installation of machinery for the purpose. The equipment in use allows the milling of stone to from 20-mesh to nearly 500-mesh in size, though 200-mesh is ordinarily the finest product required. Due to efficiency of the equipment, production costs have been made very low.

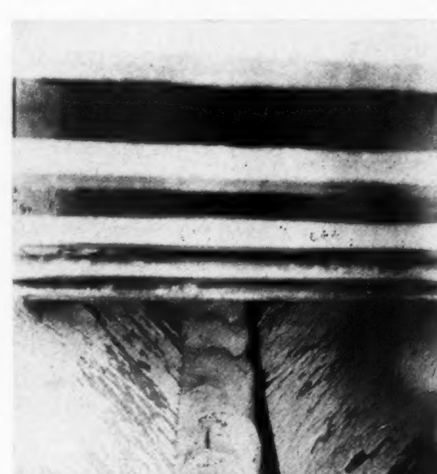
Analysis of 200-mesh ground feldspar produced is as follows:

	Per cent.
Silica	60.80
Iron oxide	0.05
Alumina	22.60
Lime	0.75
Magnesia	0.50
Potash	12.23
Soda	3.02
	99.95

Analysis of 20-mesh feldspar:

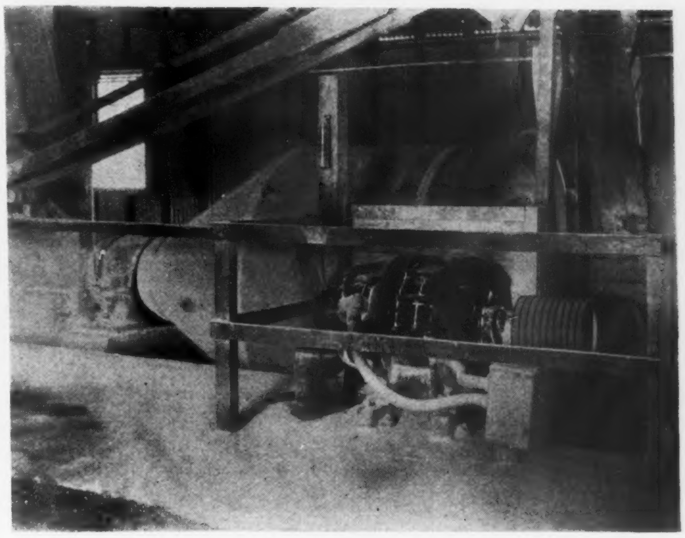
	Per cent.
Silica	65.40
Iron oxide	0.09
Alumina	19.20
Lime	0.85
Magnesia	0.95
Potash	10.30
Soda	3.15
	99.94

The method of handling this 20-mesh feldspar is described later in the article.



Screw conveyor at bottom and slat feeder, top, for handling fines

Ralph H. Magnuson, secretary-treasurer and able assistant to his father, in front of plant office



Where belt returns oversize to conical pebble mill, also showing motor and drive

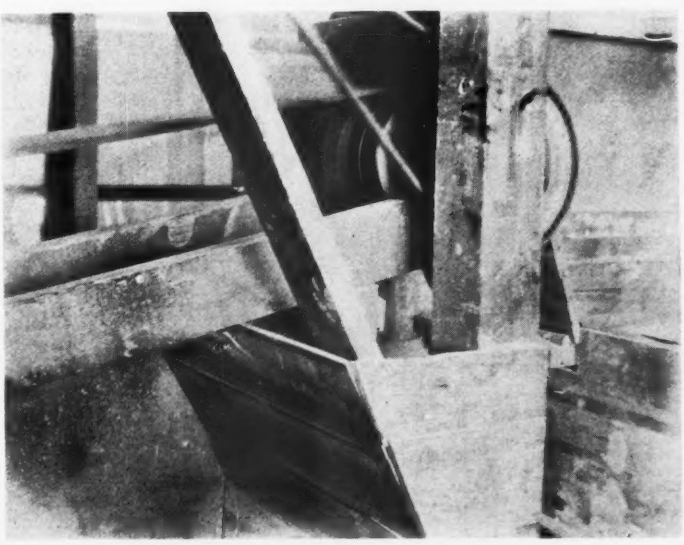
Mesh test for glass maker's spar:

	Per cent.
On 20-mesh	0.0
On 40-mesh	3.3
On 60-mesh	60.1
On 80-mesh	6.7
On 100-mesh	13.1
On 120-mesh	2.1
Through 120-mesh	14.7

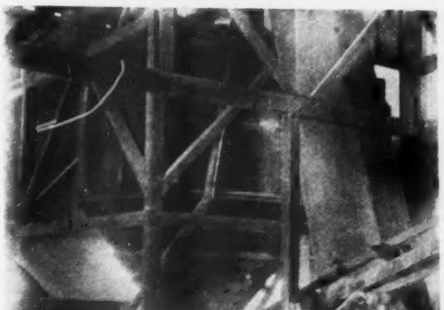
Variations in analysis are of course made to suit the individual customer. Part of the rock is unloaded in storage piles adjacent to the crusher room. Part is shoveled directly from the car into the 11- by 14-in. Universal primary crusher, which reduces it to 1½-in. and under. It is then carried, by a 16-in. bucket elevator (all elevator and conveyor belting is Copper Queen, with Dodge pulleys and buckets) 25 ft. long on centers, to a 27- by 36-in. Peter McFarland roll crusher, which reduces it to ¾-in. and under. A 16-in. bucket elevator 55 ft. long, on centers, carries this material into the 400-ton raw storage bin. The two crushers and this elevator are belt driven from a 30-hp. Allis-Chalmers motor, using a 72-in. Dodge pulley. Blending of spar from the different quarries takes place in the raw storage bin and in feeding the primary crusher.

At the bottom of the raw storage bin is a specially constructed belt feeder, 20 in. wide and 4 ft. long, provided with a ratchet device which turns it halfway and back. This distributes the rock to a 20-in. belt, 30 ft. long, with a Dings magnetic pulley, which feeds the Hardinge conical pebble mill. This mill is lined with Silex lining and uses Swedish pebbles. The mill, the feeder and 30-ft. belt, as well as a 30-ft. belt which returns the oversize to the mill, are driven by a 100-hp. Allis-Chalmers electric motor and Texrope drive and by chains and belts.

From the mill the rock drops into a 14-in. bucket elevator, 40 ft. long, which takes it up to the specially designed Magnuson separating equipment, for removal of static magnetism. It next passes into a Gayco centrifugal separator. The Magnuson separator is driven by a 3½-hp. Westinghouse motor; the elevator feeding it is driven by a 15-hp. Westinghouse motor, which also drives the Gayco separator. Float dust accumulating from the Gayco is bagged and sold for paint and enamel filler. Fines are carried from the bottom of the separator into a 200-ton loading bin, by a 16-in. bucket elevator, 55 ft. long on centers, driven by a 6-hp. Westinghouse motor. The oversize and a portion of the fines are carried by a similar elevator driven by a similar motor to a 5-ft. by 36-in. Traylor vibrating scalping screen, at the top of the plant, driven by a 3-hp. Westinghouse motor.



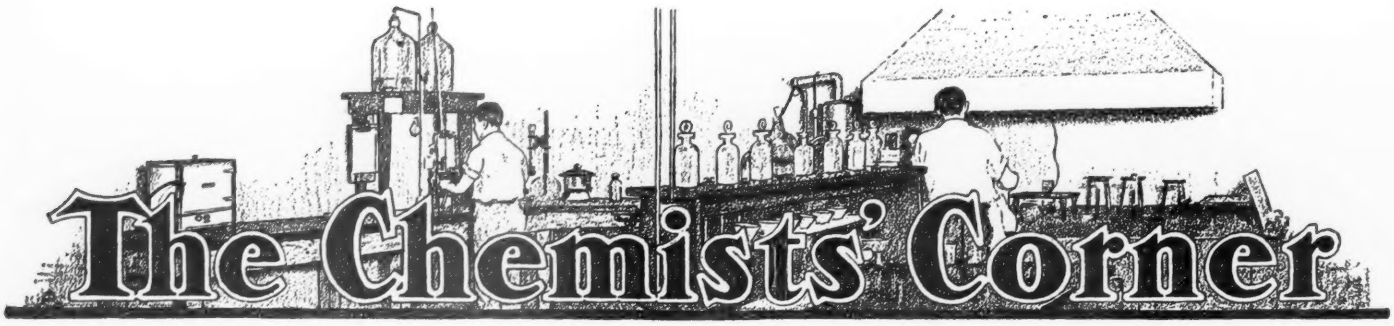
Feed to the pebble mill showing magnetic separator



This centrifugal separator plays an important part in production

The 20-mesh fines passing through this screen go by gravity to a 50-ton storage bin as glass maker's spar. The oversize and a percentage of the fines return by gravity through an 8-in. metal pipe to the boot of the 30-ft. return conveyor previously mentioned, and are carried back to the pebble mill.

Two 50-ton loading bins, for glass maker's stock (20-mesh), are equipped for loading direct by gravity. The 200-ton loading bin for fines, previously mentioned, is equipped for loading either direct by gravity from the elevator, or, in case of necessity by a screw conveyor installation below the bin, which carries the fines back into the car by placing extension screws. On account of the tenacity of the fine dust a special feeder was designed at the plant for use with the screw loader. This consists of a series of slats 30 in. long, secured to cog-chains at each end, 2 in. apart. The length of the feeder is 7 ft. The opening in the bin bottom is 28 in. by 5 ft. The feeder drags the dust over a large sheet of metal, into a sloping hopper, in the bottom of which is the screw loader. The unit is driven by a 10-hp. Westinghouse motor.



Studies of the Lime Ratio in Cement

Influence of This Factor Upon Manufacture and Quality, with Some Conclusions Drawn from Practical Experience

By Alton J. Blank

General Superintendent and Supervising Chemist, Compania de Cemento Portland "Landa," S.A., Puebla, Puebla, Mexico

OF THE CHEMICAL INGREDIENTS found in portland cement, calcium oxide exercises the greatest influence upon its manufacture and quality, and is the better understood by the cement manufacturers.

In laboratory control, and as a basis for comparing the manufacture and quality of portland cements, the ratio of silica, alumina and iron to the calcium oxide, known as the Lime Ratio, is usually made use of rather than the actual percentage of calcium oxide present in the cements. Usually, though not in all cases, cements high in calcium oxide have correspondingly high lime ratios. Both high and low lime ratio cements have their champions in any number of plants. The more conservative of the cement plant chemists lean towards the low lime ratio cements due to the greater margin of safety had in their manufacture. Head burners prefer burning the low lime ratio mixtures in the kilns, while mill operators would rather see the higher lime ratio clinker entering the mills. Superintendents would rather see a happy medium struck as to the lime ratios in order that both kiln and mill departments may operate with normal efficiencies.

As a basis for comparing the results obtained with normal, high and low lime ratio mixtures, clinkers and cements, and to better illustrate the influence of the lime ratios upon kiln outputs and fuel consumptions, mill outputs and power efficiencies, and cement quality, the writer has prepared a series of charts from data accumulated

CHART No 1

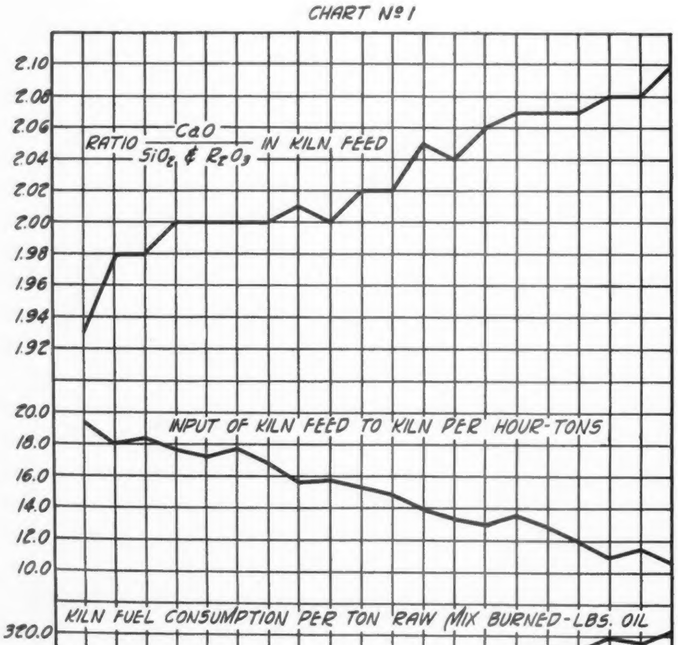
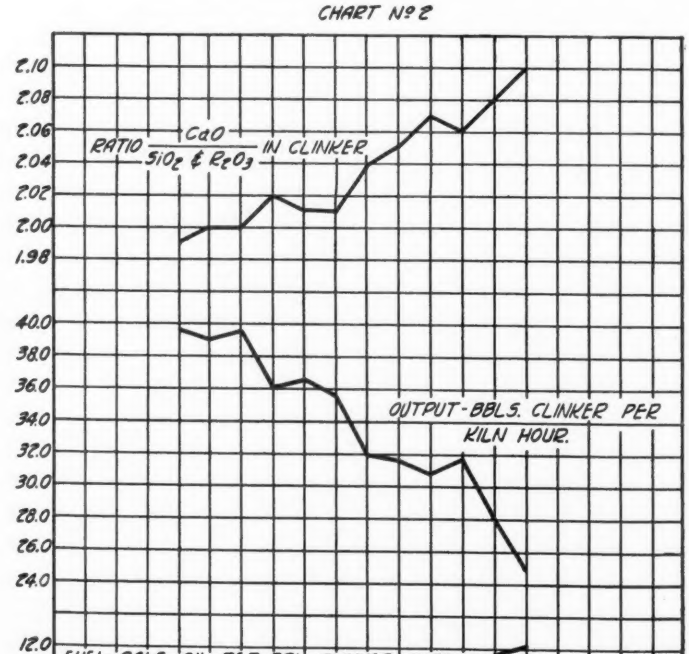
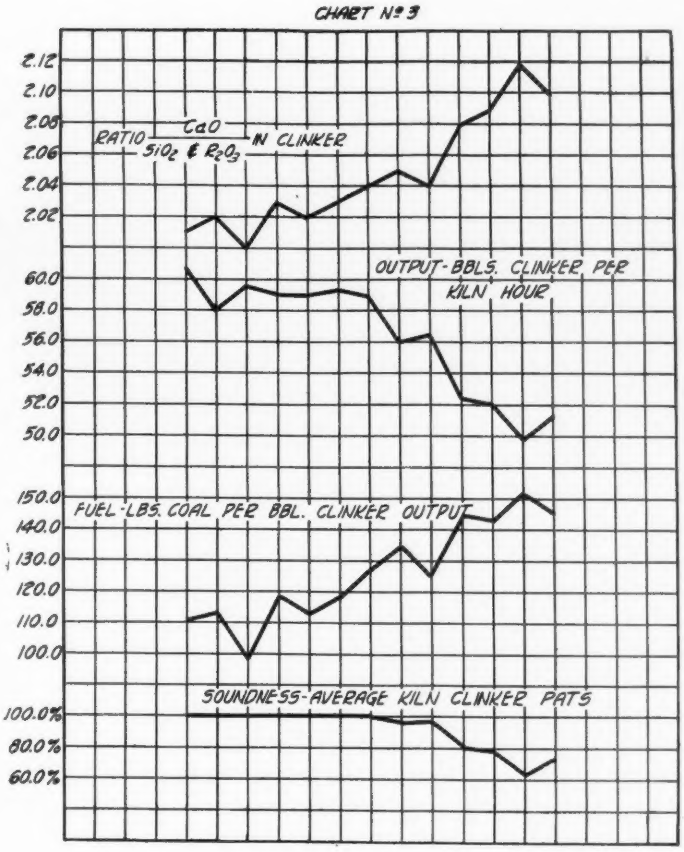
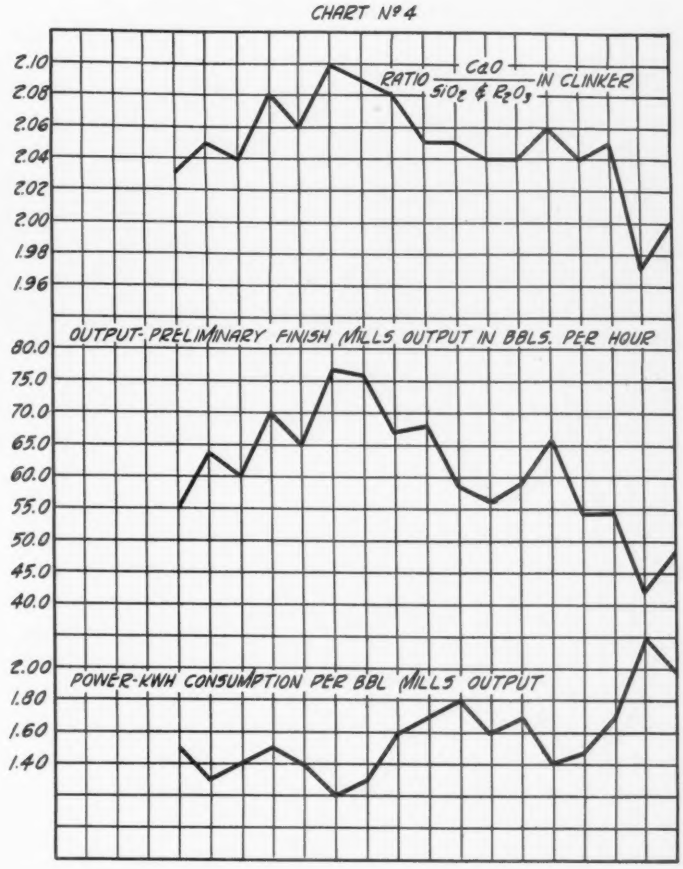


CHART No 2







through experience obtained at a number of cement plants over a period of years.

Chart No. 1

In Chart No. 1, the input of raw mixture to the kilns in tons per hour and the consumption of fuel in pounds of oil per ton of raw mix input, is plotted against the lime ratio of the raw mixtures entering the kilns. The raw mixtures in question had but small variations in their ratios other than the lime ratio, and a typical analysis of the mixtures is as follows:

SiO_2	14.28%
Al_2O_3	4.96
Fe_2O_3	2.04
CaO	42.65
Mgo	1.70
Loss	33.70

ANALYSES: A study of the curves plotted on the chart shows the variation from one extreme to the other of the lime ratio in the raw mixtures to result in a difference of 80% in the tonnage of raw mix input to the kilns, and a difference of 33% in fuel consumption per ton of input.

Chart No. 2

In Chart No. 2, the kiln outputs in barrels of clinker per hour and the kiln fuel consumption in gallons of oil per barrel of clinker output, is plotted against the lime ratios of the clinker. A typical analysis of the clinker is as follows:

SiO_2	21.20%
Al_2O_3	7.86
Fe_2O_3	3.34
CaO	65.40
MgO	1.70
Loss	0.36

Editor's Note

FROM the study which Mr. Blank details in this article he reaches some conclusions on the true effect of high lime ratios in cement raw materials, adding thereto some further deductions from his experience as a plant chemist and superintendent.

ANALYSES: A study of the curves plotted in the chart shows that a variation from one extreme to the other of the lime ratio in the clinker results in a difference of 74% in the kiln output of clinker, and a difference of 50% in the consumption of fuel per barrel of clinker output.

Chart No. 3

In Chart No. 3, the output in barrels of clinker per kiln hour and the fuel consumption in pounds of coal per barrel of clinker output, is plotted against the lime ratio of the clinker, as is the soundness of the clinker pats. A typical analysis of the clinker is shown as follows:

SiO_2	21.92%
Al_2O_3	6.86
Fe_2O_3	3.02
CaO	64.94
MgO	2.33
SO_3	0.22
Loss	0.38

ANALYSES: A study of this chart shows the variation in the lime ratio of the clinker to result in a difference of 20% in the kiln output of clinker and a difference of 50% in the consumption of kiln fuel per barrel of clinker produced. At the same time the higher lime ratio in the clinker results in around 30% of the clinker being initially unsound.

Chart No. 4

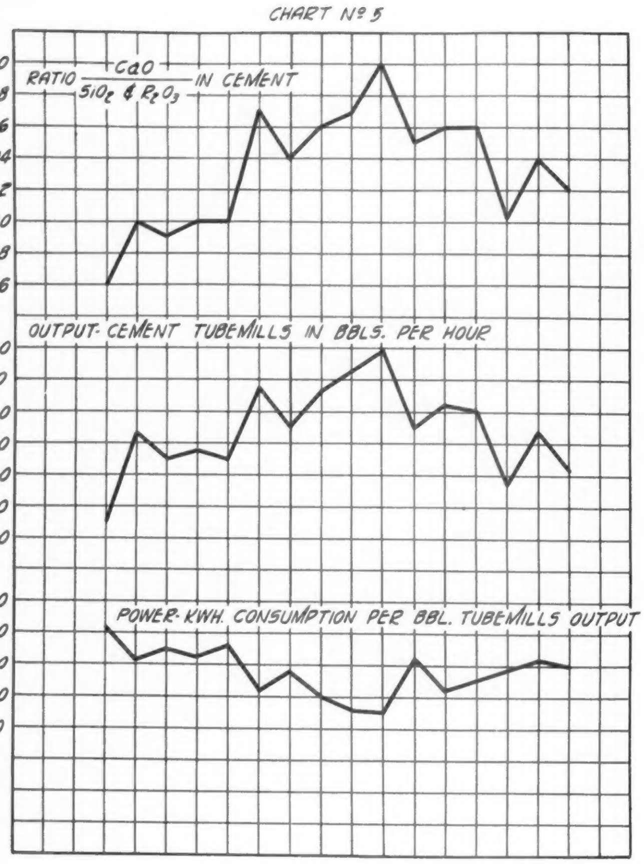
In Chart No. 4, the output of the preliminary grinding finish mills in barrels per hour and the power consumption in kw.h. per barrel of mill output, is plotted against the lime ratio of the clinker fed the mills. A typical analysis of the clinker is as follows:

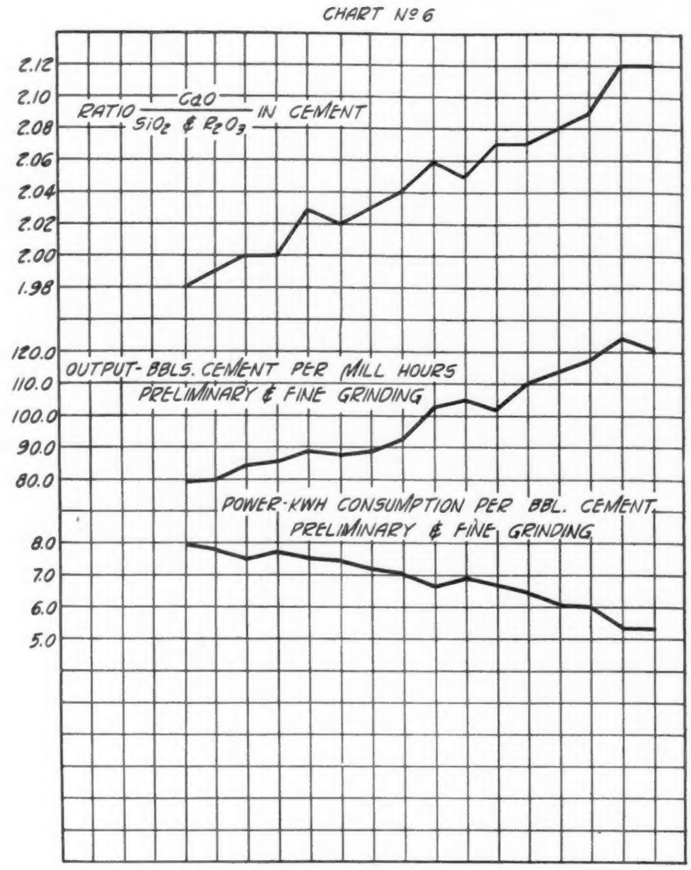
SiO_2	20.88%
Al_2O_3	7.62
Fe_2O_3	2.46
CaO	64.75
MgO	3.37
Loss	0.34

ANALYSES: A study of this chart shows the variation in the lime ratio of the clinker entering the preliminary grinding mills to result in a difference of 80% in the mill outputs and in a difference of 80% in the power consumption per barrel of mill output.

Chart No. 5

In Chart No. 5, the output of the tube mills in barrels of cement per hour and the power consumption in kw.h. per barrel of mill output, is plotted against the lime ratio of the cement discharged from the mills. A typical analysis of the cement is as follows:





SiO_2	20.70%
Al_2O_3	7.42
Fe_2O_3	2.38
CaO	62.64
MgO	3.46
SO_3	1.79
Loss	1.36

ANALYSES: A study of Chart No. 5 shows the variation of the lime ratio from one extreme to the other in the cement to result in a difference of 50% in the output of cement received from the tube mills, and in a difference of 80% in the power consumption per barrel of mill output.

Chart No. 6

In Chart No. 6 the outputs of the preliminary and fine grinding cement mills (both yielding equal outputs) in barrels of cement per hour and the combined power consumption of these mills in kw.h. per barrel of output, is plotted against the lime ratio of the cements as discharged from the tube mills. A typical analysis of this cement is as follows:

SiO_2	20.54%
Al_2O_3	7.64
Fe_2O_3	2.52
CaO	61.94
MgO	3.44
SO_3	1.85
Loss	1.66

ANALYSES: A study of Chart No. 6 shows the variation in the lime ratio of the cement to account for a difference of 56% in the output of the preliminary and fine grinding cement mills, and in a difference of 50% in the total combined power consumption per barrel of cement output.

Chart No. 7

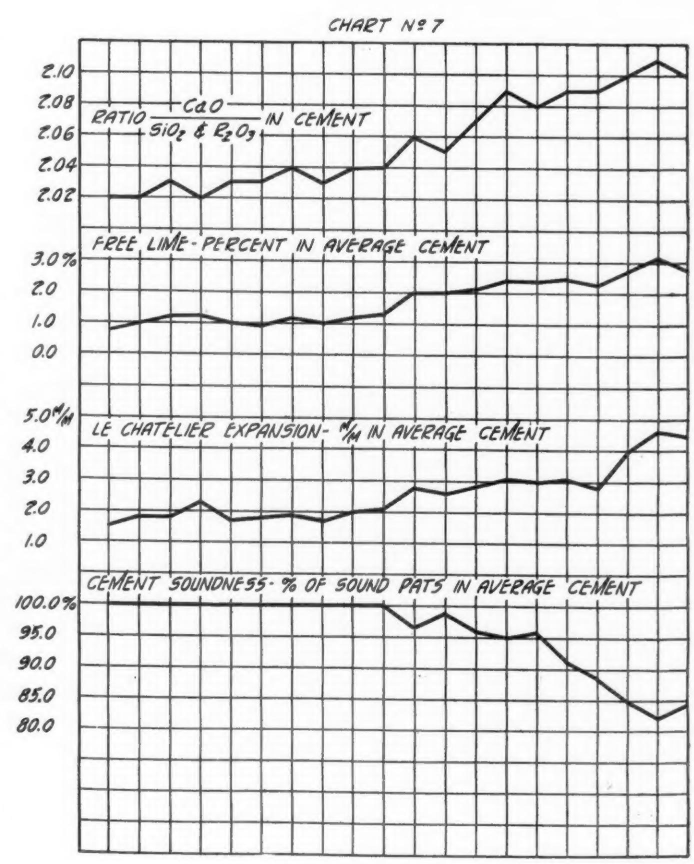
In Chart No. 7, the "free lime" present in the cement, the Le Chatelier expansion and the soundness of the cement is plotted against the lime ratio of the cement. A typical analysis of this cement is as follows:

SiO_2	20.12%
Al_2O_3	6.94
Fe_2O_3	3.04
CaO	62.24
MgO	3.18
SO_3	1.88
Loss	1.86

ANALYSES: A study of the curves found in this chart shows the wide variation of the lime ratio of the cement to result in the difference of 2.5% in the amount of free, or uncombined, lime present in the cement, together with the difference of 3.2 mm. in the expansion and some 17% of the cement being unsound.

In the arrangement of the data as shown in the seven charts under study, care was taken to avoid any unusual circumstances or conditions which might have some bearing on the results obtained. To that end these data may be relied upon in the formation of conclusions as to the part played by the lime ratio upon the manufacture and quality of a cement.

Though more or less confirming the ex-



perience of other investigators who have covered the subject, those conclusions as drawn by the writer from the data as shown, are given herewith:

Conclusions

(*a*) Raw mixtures containing high lime ratios are hard to burn in the kiln, yielding low kiln outputs and consuming a maximum of fuel.

(*b*) High lime ratio clinker grinds easily in both preliminary and fine grinding cement mills, yielding large mill outputs and consuming a minimum of power.

(*c*) High lime ratio cements show greater presence of free lime and have a tendency towards unsoundness.

To the above analyses the writer adds certain other conclusions formed through experience with this subject:

(1) Raw mixtures of high lime ratio variety upon being subjected to extreme fine grinding, combine more readily in the kiln.

(2) High lime ratio clinker is of uniformly small size, the other extreme resulting in large irregular clinker.

(3) High lime ratio cements have low specific gravities, the opposite being true of low lime ratio cements.

(4) High lime ratio cements of given finenesses are light as to color, the opposite being true of the lower lime ratio cements.

(5) High lime ratio cements have a tendency towards unsoundness, low lime cements being uniformly sound.

(6) High lime ratio cements have their setting times retarded while low lime ratio cements have their setting times accelerated.

(7) High lime ratio cements have good strengths up to ages of three months, but thereafter show little increase and at later ages are inclined towards retrogression.

(8) High lime ratio cements that are unsound due to their being over-limed, become sound upon being stored for a short time, while high lime ratio cements that are unsound due to underburning require prolonged storage before becoming sound.

(9) High lime ratio cements deteriorate very rapidly on being stored for long periods, the lower lime ratio cements being less affected.

(10) High lime ratio cements have less resistance to all kinds of influences, while low lime ratio cements are more resistant.

(11) High lime ratio cements have a tendency towards efflorescence in concrete.

(12) Extremely high lime ratio cements may be termed as dangerous cements, while low lime ratio cements are to be termed as safe cements; however, both have their advantages.

Estimation of Free Calcium Hydroxide in Set Cements

A NEW CALORIMETER METHOD for the estimation of free calcium hydroxide in hydrated portland cement, which has been evolved at the Building Research Station of the Department of Scientific and Industrial Research, London, England, is described in the Department's Technical Paper No. 9 by G. E. Bessey, B.Sc.A.I.C.

It is based on the fact that the dissociation of calcium hydroxide does not occur below 350 deg. C. and is nearly complete after ignition for half an hour at 550 deg. C. Samples of the cement are hydrated at each of these temperatures and the difference in heat evolved on rehydration of the samples is measured.

An electric-tube furnace, controllable to ± 5 deg. C., over a range of 100 deg. to 1000 deg. C., was used for ignition or dehydration. The calorimeter system used to determine the heat of hydration consisted of a wide-necked DeWar flask imbedded in slag wool and containing a measured quantity of water (100 cc.), the sample being placed in it in a corked test tube. The water was thoroughly stirred before and during the experiment and the temperature read on a Beckmann thermometer. A duplicate system without a sample was used to allow a correction to be made for external changes, both systems being placed in a large box packed with slag wool and having a wooden cover provided with the necessary openings.

The procedure is to place a 10-gm. sample (ground to pass a 100-mesh sieve) in a crucible in the electric furnace for a half hour at 350 deg. C. ± 10 deg. It is then cooled for a half hour in a dessicator and brushed into the test tube of the calorimeter apparatus, the tube corked and placed in the calorimeter, and the liquid in both calorimeters stirred until the temperature is steady. The bottom of the tube is then broken by a rod, allowing the sample to fall into the calorimeter flask, and the mixture is vigorously stirred for four minutes, at the end of which time the rise in temperature is noted. Corrections are made for heat losses of the calorimeters and the specific heat of the sample in calculating the heat evolved.

The procedure is then repeated with another sample of the same weight ignited to 550 deg. C. ± 10 deg., and the heat evolved calculated as before.

From these data the lime content present as $Ca(OH)_2$ is calculated by the formula:

$$\text{Free lime in terms of CaO}(\%) = \left[\frac{Q_2}{W_2} - \frac{Q_1}{W_1}\right] \times \frac{100}{273} \times f \times k,$$

where Q_1 and Q_2 are the quantities of heat evolved at 350 deg. C. and 550 deg. C. respectively.

W_1 and W_2 are the weights of samples used for estimations at 350 deg. C and 550 deg. C.

273 is the heat of hydration of calcium oxide in calories per gram.

f is a correction factor for incomplete decomposition of $Ca(CO)_2$ at 550 deg. C. and carbonization of sample.

It may vary slightly with the furnace used; for the furnace and conditions of this investigation it was $\frac{100}{93}$.

k is a correction factor for combination of lime with the other materials during ignition. For portland cement it is 1.04.

In developing this method experiments were carried out, as to loss on ignition and heat of hydration, on pure calcium hydroxide, hydrated portland cement and aluminous cement, which showed that four minutes is sufficient time for complete hydration, and that the temperature range from 350 deg. C. to 550 deg. C. is best for the dehydrating, as there is least interference of other reactions within this range.

The method was found to be satisfactory, reproducible, and accurate within 0.5% for hydrated portland cement, and also found to be satisfactory for portland cement concrete with ordinary inert aggregates and for sand-lime mortars. It has been applied to sand-lime bricks and to lime-pozzolana mortars and concretes with some success.

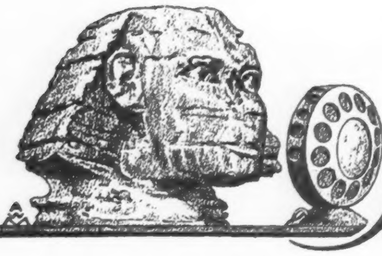
The free lime content is seen to increase with age, and the rapid-hardening portland cements are seen to have a higher free lime content than normal portland cement. In the mortars the free lime content is approximately proportional to the amount of cement in the mortar, for a given cement and age.

The possibilities of applying the method to investigations on the rate and degree of hydration of cements, either neat, or in mortar or concrete, are apparent. Also the method is directly applicable to portland cement concretes with limestone aggregates, and with certain corrections to pozzolana and slag aggregates, as well as to lime mortars, hydrated limes, and sand-lime bricks, which require different corrections.

The department is also making investigations to determine whether this method may not be useful in determining the initial quality of portland cements and the effects of storage and aëration.

PER CENT. CaO PRESENT AS $Ca(OH)_2$

	1 month	3 months	12 months
1. Neat portland cement	8.2	9.05	9.3
2. Neat rapid-hardening portland cement	7.9	9.45	10.35
3. Mortar 2:1, portland cement-sand	5.7	6.4	7.7
4. Mortar 1:1, portland cement-sand	4.25	4.6	5.7
5. Mortar 1:2, portland cement-sand	2.25	2.3	3.3
6. Mortar 1:1, rapid-hardening portland cement-sand	6.0	6.85	......
7. Mortar 1:1, normal portland cement-sand	4.6	4.35	......

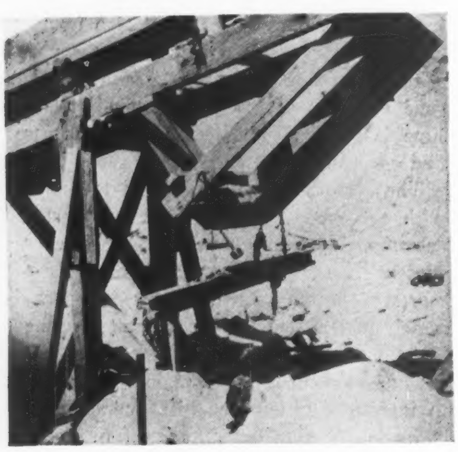


Hints and Helps for Superintendents

A Simple Conveyor Belt Take-Up

A SIMPLE yet not common type of conveyor belt take-up is illustrated here. Probably it is not so efficient as the more complicated type of vertical weighted take-up, but its chief virtue lies in the ease with which it can be constructed without sacrificing a great amount of efficiency. It is particularly adapted to smaller belts.

The take-up consists of a framework of 2x6's suspended beneath the conveyor framework in such a manner that it can swing on pivots and hence always tends to hang straight down. At the lower end of the take-up frame is mounted a belt roller and the return side of the belt is passed under this. Thus the frame and the roller push downward on the belt and take up the slack readily. It is, of course, necessary to hang weights on the take-up to give it enough pull to keep the belt sufficiently tight. Short sections of railroad rails make excellent weights since they can be hung at their ends at each side of the framework, and do not have an opportunity to swing around or become loosened.



A conveyor belt take-up which is easily constructed

Mistakes in Heating Well-Drill Bits

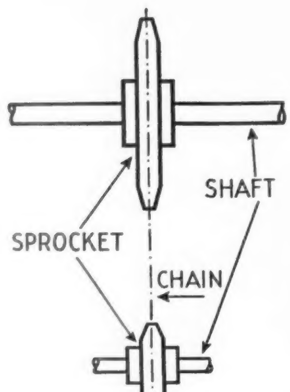
1. PLACING a bit in a fire which has a hot spot and is not large enough to cover the entire end of the bit.

2. Heating a bit in a forge or fire which has a very thin fuel bed, through which holes are sometimes burned, allowing the air blast to strike the steel.

3. Heating the bit on one side with no hood or cover to retain the heat in the top side of the bit after it is turned and allowing the air to strike the steel, causing rapid oxidation or scaling.

4. Heating the steel to a high temperature on one corner or one side, which causes unequal expansion with possible rupture of grain structure.

5. Heating the steel to excessively high temperature where the oxygen in the air unites readily with the carbon and consumes it from the surface of the steel. Heating to high temperatures also increases the size of the crystals to a point where an excessive amount of forging is necessary to again break them up.—*The Armstrong Driller.*



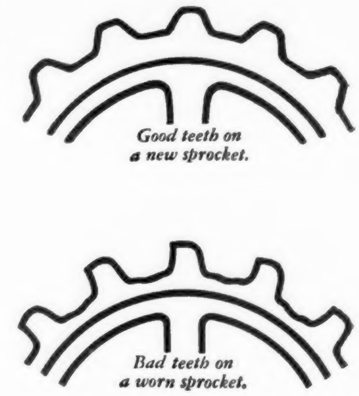


Fig. 1 (left) showing sprocket wheels in line on the shafts. Fig. 4 (center) showing how the chain is cleaned by soaking in kerosene. Fig. 5 (right) the difference between a good and worn sprocket

How to Make Chain Drives Last Longer

By CHARLES R. WEISS
Chief Engineer, Link-Belt Co., Indianapolis, Ind.

I WAS recently asked, "How Can I Make My Chain Drives Last Longer?" and after considering the question I answered this maintenance man as follows:

"To make your chain drives last longer, there are just five simple things for you to do. Note the sketches I have drawn for illustrating each point.

"First: Proper Alignment. Be sure that sprocket wheels are in line on the shafts, as shown in Fig. 1. If the sprockets are not exactly in line, a side pull develops which concentrates the load on the side of the sprocket teeth and on one side of the chain. This faulty alignment results in excessive wear on both chains and sprockets.

"Second: Proper Adjustment. The chain should be run just a little slacker than a belt —about as shown in Fig. 2. Too much tension causes undue wear on the chain and wasteful friction on the bearings. Not enough tension, of course, may allow the chain to jump the sprockets or ride the teeth and break.

"Third: Frequent Lubrication. The chains should be lubricated at frequent intervals. A good grade of light cylinder oil should be used. A paint brush is a good thing for applying oil to the chain joints, as I have

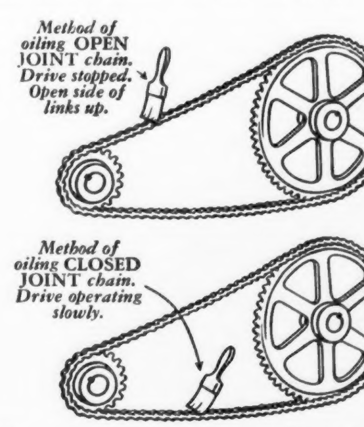


Fig. 3. Applying lubricating oil with a paint brush

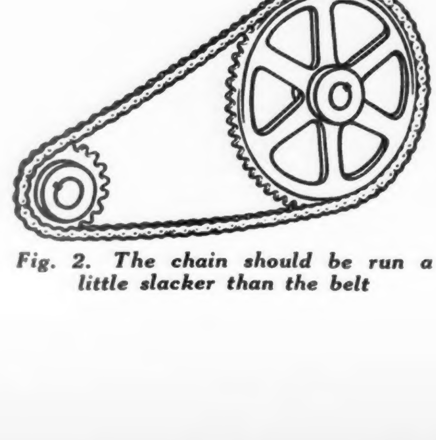


Fig. 2. The chain should be run a little slacker than the belt

indicated in Fig. 3. Paint the open joints on open (upper) side. Oil the closed joint chains on inside (upper side of lower run) while drive is running slowly.

"Fourth: Frequent Cleaning. Open drives should be cleaned regularly. Take the chain off and clean it well by soaking and dipping in kerosene, see Fig. 4. Dry well, and oil it thoroughly before starting up again. Before shutting down a machine for a period of time clean the chain and oil it with heavier oil or grease. When it is to be used again, re-clean and oil with light oil.

"Fifth: Well-fitting Sprockets. Last but not least, look at the sprocket wheels from time to time to make sure that they are not worn enough to injure the chain. Before the teeth are worn to a hook shape, as shown in lower illustration of Fig. 5, the wheels should be replaced with accurately made and close-fitting sprocket wheels."

By giving only ordinary attention to your chain drives you make them last longer and run better and also reduce the chances of a breakdown.

If these recommendations are followed, I am sure you will be time and money ahead and will get the best wear and service out of your machinery.

Timing the Concrete Mix

PRODUCERS of ready-mixed concrete or cement products are often prone to guess at the time given to each mix with a resultant wide variation in the mix produced. With the scientifically planned mixes required by modern specifications this practice is no longer permissible and producers are adopting various ways and means of obtaining a correctly timed mix with the least trouble.

Two methods are used by the Hecker company of Champaign, Ill., at its central concrete mixing plant for obtaining the correct timing for the mix. The first method is the use of a common egg-timing sand glass mounted on a beam just above the mixer. The glass, which was purchased at a 10 cent store, is so arranged that it can be inverted when the sand is completely run through so the timing of the next mix is possible at once. By this device, a glass timed for a three-minute egg will also call time for a three-minute mix. This egg glass works very well but in damp weather it is likely to clog up. Left in the sun for a while it will return to its usual free running condition.

The other method, which actually furnishes more accurate timing, is by the use of a photographic exposure clock. This clock resembles the stop watch used in athletic contests since it can be started and stopped by merely pressing a button and is fitted with a large second hand which goes completely around the face during one minute. It is ordinarily used for the timing of the exposure in taking photographs and is manufactured by one of the large camera manufacturers. The clock has the advantage of permitting a change in the length of the mix, not being limited to the three minutes of the egg glass.

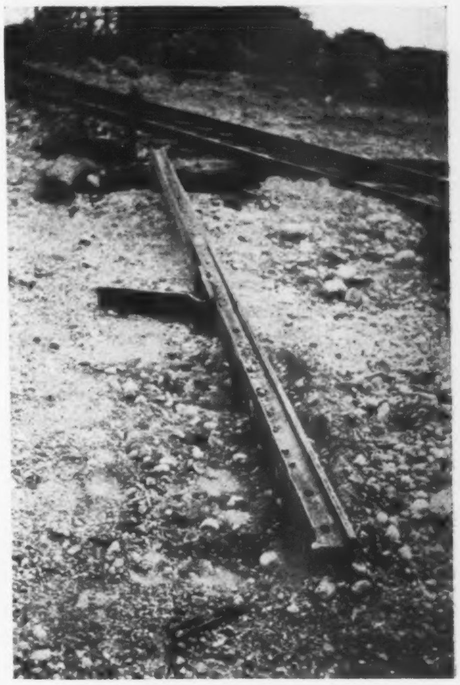
Reducing Dust Accumulation in Stone Bins

WHERE CRUSHED STONE is spouted from the screens into loading bins below, there is always more or less dust and fines in the spouts, which keeps dropping into the bin and mixing with the stone and thus spoiling its appearance and cleanliness. This is especially true in the case of the larger sizes of stone where the fines keep accumulating until they finally flow out in uneven and unsightly quantities as the bin is drawn low and spoil the appearance of the stone. At one plant visited this dribble of fines into the bin was materially reduced by the simple expedient of hanging buckets below the spout openings as shown in the accompanying picture, low enough to miss the stream of stone and still catch the fine material.

Breaking Down a Gravel Bank

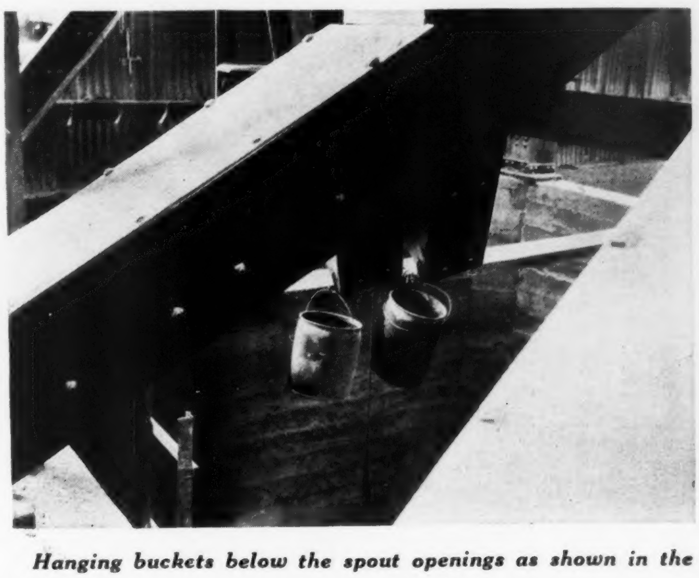
TO LOOSEN UP a gravel bank that is too hard for a steam shovel to dig into conveniently, the Northern Gravel Co. has used a railroad rail hooked on to the bucket of its shovel at its plant at Barton, Wis.

A strap of 1x4-in. iron was bolted to the flange of a 20-ft. rail, and bent to form a hook to go over the teeth of the shovel.



Hook bolted to a railroad rail for use in breaking down a gravel bank

The shovel then rammed the projecting end into the bank and by elevating the bucket, the rail was pulled up through the bank breaking it down. However, it was found that the 1-in. iron would not stand the strain, but bent considerably, so it was necessary to replace it with a heavier piece. The results are reported to be satisfactory.



Hanging buckets below the spout openings as shown in the two illustrations here reduces the flow of fines into the bin

Pertinent Paragraphs ¶

Interesting items from everywhere condensed and "abstracted" for the benefit of busy readers

RUSHMORE NATIONAL Memorial, that stupendous project being directed by Gutzon Borglum, on the face of Rushmore Mountain, about 27 miles southwest of Rapid City, S. D., and embracing colossal figures of Washington and Jefferson together with an entablature using the text furnished by former President Coolidge, is being carved out of a fine-grained gray granite, remarkably free from flaws and lending itself admirably to sculptural work. Washington's figure covers a vertical distance of more than 200 ft. Mr. Coolidge's famous 500-word history of the United States will stand out in letters 3 ft. high with a background in the shape of the Louisiana purchase. Dynamite is used for blasting to within 3 to 4 in. of the final surface.

~ ~ ~

WHAT IS SAID TO BE the longest railroad gondola will shortly be part of the equipment of one of our prominent roads which has ordered 1500 of these cars. They will be 65 ft., 6 in. inside length. The elongated gondola is being built to supply a need for carrying long structural shapes, sheets, pipes and rails. The present average gondola is between 35 and 50 ft. in length.

~ ~ ~

ALONG WITH the other things that the modern business man must worry over comes a ukase from the postmaster general specifying exact dimensions of door slots for the delivery of mail.

~ ~ ~

CALIFORNIA seems to be making good its claim as being the country's best state for the automobile driver. It has a flat $3 fee and a 3c gas tax. And it spends every cent of its tax revenue on highways, none of it going to other administrative departments, schools and so forth.

~ ~ ~

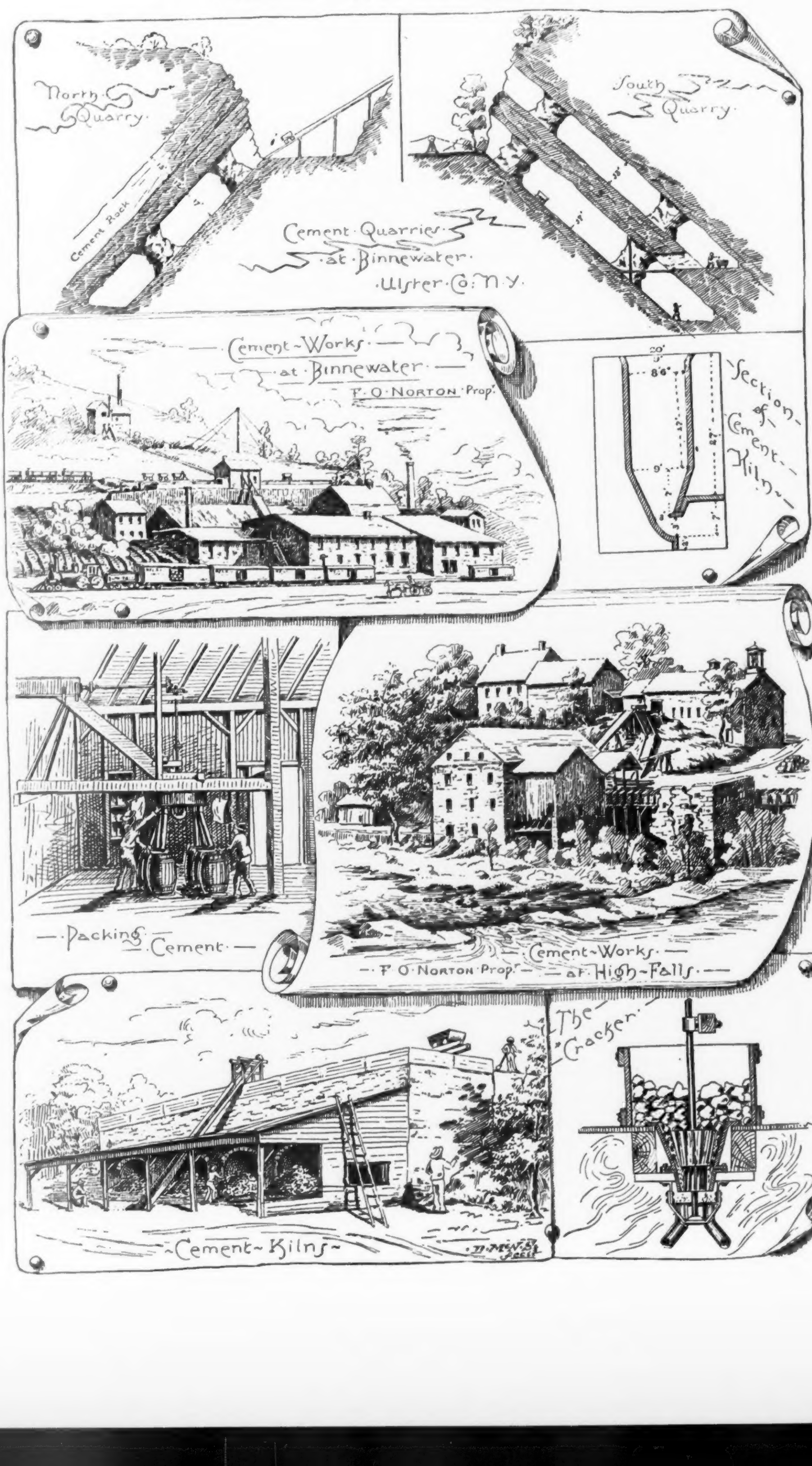
WILD CONJECTURES that a spot near the fair grounds at Billings, Mont., might possibly have been the Garden of Eden followed the discovery by a 13-year-old boy of a peculiar rock formation having the appearance of an apple with a healthy bite taken out of it. Close examination by geologists revealed that it was merely a concretion formed around a pebble.

AN UNUSUAL concrete water tank recently designed for an English gas works provides two circular compartments, one within the other.

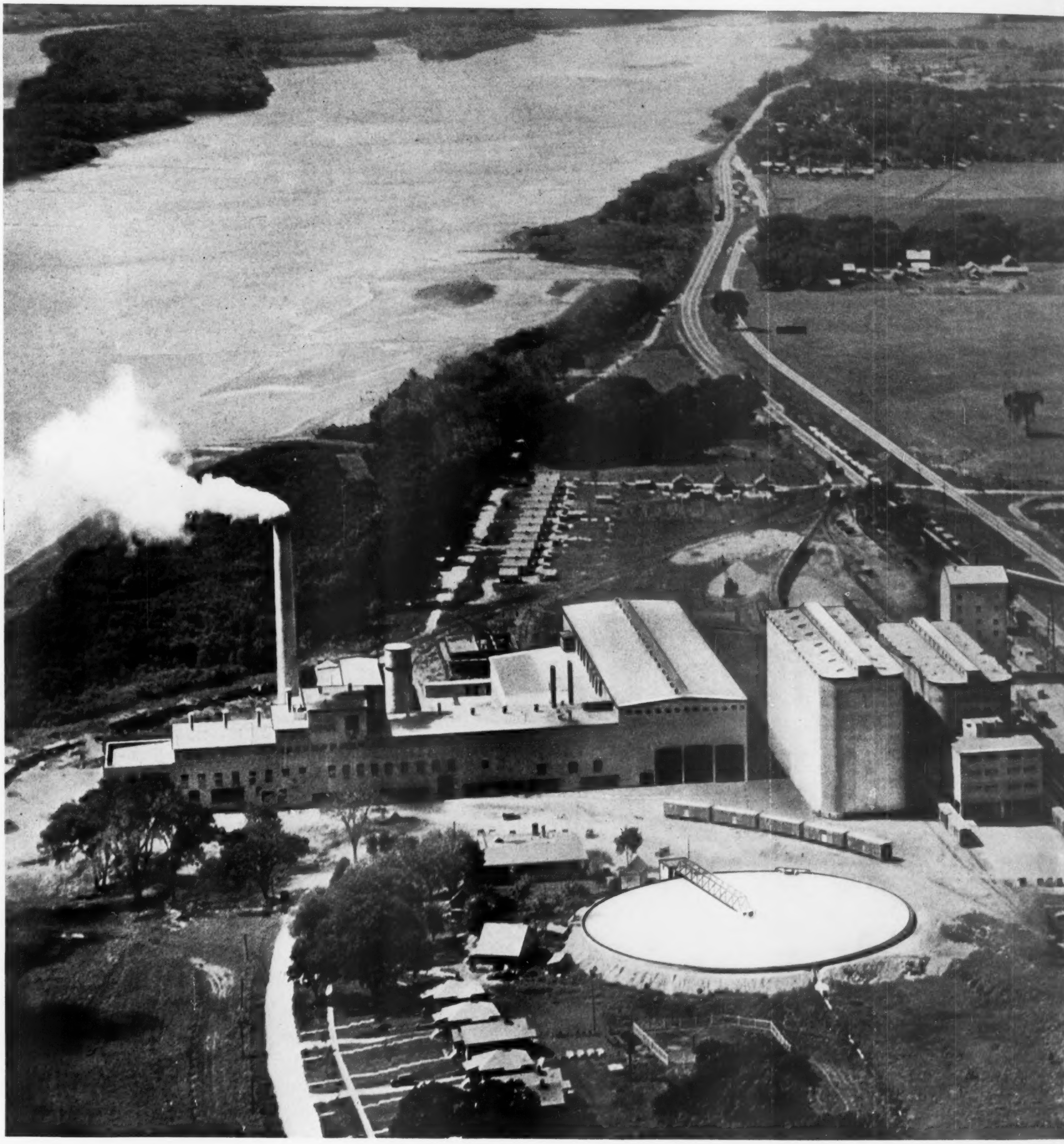
Delving Into History of Cement

A CEMENT INDUSTRY patriarch sends us a tear sheet from an issue of *Engineering News* in the year 1883 containing some interesting illustrations, done in the painstaking etching-like style prevalent in those days, to go with a story concerning cement manufacture in Ulster County, N. Y. Methods of quarrying, construction of kilns and manner of charging and the "crackers" used for crushing unburned rock can be seen. The famous Rosendale cements were produced and the capacity of the Binnewater plant shown was 200,000 bbl. during the average nine-month season.

From an old print of a cement plant

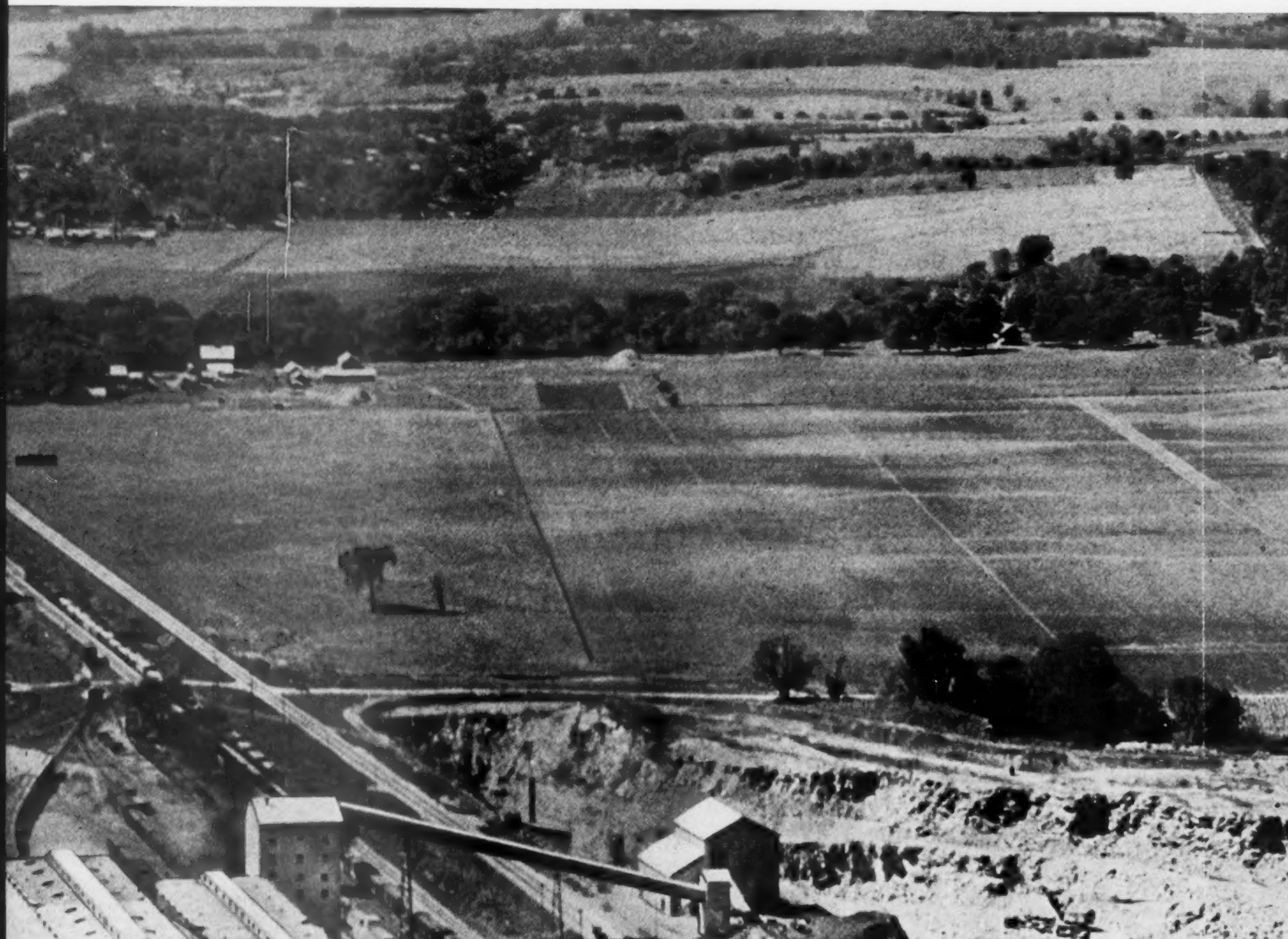


Supplement to Rock Products, Volume XX



Airplane view of the Davenport, Iowa, plant of the Dewey Portland Cement Com

cts, Volume XXXIII, No. 25, December 6,



plant of the Dewey Portland Cement Company, showing 225-ft. traction thickener in foreground

r 6, 1930

First Closed-Circuit Wet-Process Cement Mill*

Dewey Portland Cement Co. Increases Capacity and Quality with Large Reduction in Power Costs

CLOSED-CIRCUIT, wet grinding of cement-making materials has for several years been the subject of much discussion in the portland cement industry. Numerous laboratory investigations have been carried out publicly and privately which, together with the results from at least two semi-commercial scale test runs, have yielded data of value from the theoretical standpoint.

The first commercial scale installation for closed-circuit wet grinding was made last spring at the Davenport, Iowa, plant of the Dewey Portland Cement Co. This installation has now been in operation for several months, handling a tonnage of raw materials equivalent to a daily average output of 6200 to 6600 bbl. of cement, and the expectations of the management have been realized or exceeded in virtually all respects. Briefly, it has been demonstrated conclusively on a high tonnage basis that it is now possible to improve the quality of the cement and at the same time reduce the cost of raw grinding, a result not often realized in industry today.

The ambitious modernization program recently completed at Davenport is a direct result of a farsighted attitude of the Dewey management, which has led to the adoption of advanced processing methods, never used before in the industry, in anticipation of more stringent demands for quality on the part of its clientele accompanied by possible price competition from foreign producers. The remodeled grinding plant has, during the past summer, demonstrated its ability to handle greater tonnages per mill than ever obtained elsewhere with materials of similar character, and the flexibility with which the fineness may be varied has placed the management in a position to supply as high a quality of cement as its customers may require.

Pioneering a New Process

That it required a great deal of confidence, and faith in the ultimate outcome, on the part of the management goes without saying. Experience has shown that the company which pioneers an intrinsically different method of processing generally has to shoulder the greater portion of the operating grief, without which no new method, regardless of the pains taken in its development in the laboratory or the test plant, is launched in its finally perfected form.

H. F. Tyler, first vice-president, Dewey Portland Cement Co., in charge of operations at Davenport, Iowa, who pioneered closed-circuit, wet grinding

With the trend of the times definitely pointing toward cement of superior quality, and the regrettable failure up to that time of Congress to protect the American cement industry against the dumping of cheap foreign cement, produced under labor conditions inconsistent with American standards, the improvement in practice recently instituted at the Dewey plant could no longer be postponed, in the opinion of its owners. On the belief that the pioneer work at Davenport is of interest to the industry as a whole as pointing the way toward a more complete solution of certain problems connected with the production of high-early-strength cement, permission has been given to release the data on operation upon which this article is based.

A description of the original plant at Davenport was published in ROCK PRODUCTS, September 17, 1927, shortly after it was placed in operation. Subsequently the capacity of the plant was doubled by the addition of two more kilns, grinding mills and accessories. A short summary of the main features of the plant are included here.

The raw materials are crushed in gyratories followed by hammer mills to approximately 8% plus ¾-in., 45% plus 4-mesh and 82% plus 28-mesh.

One of the three original Allis-Chalmers compeb mills, used for raw grinding, is now used for finished clinker grinding, since two mills now easily do the work formerly done by three. These mills are driven at 20 r.p.m. by 500-hp. synchronous motors and are each loaded with 13 tons of 2¼-in. to 4-in. balls in the primary compartment and 39 tons of ¾-in. to ⅞-in. balls in the secondary compartment. These are 7 ft. by 26 ft. two-compartment mills.

Changes in Original Equipment

A few changes were made in order that the mills might better handle the anticipated circulating load of oversize material. The slotting of the primary grids was increased from ⅜-in. by 2-in. to ⅝-in. by 2-in., thus increasing the area of the openings from 497 sq. in. to 672 sq. in. Peripheral screens were removed and larger pipe feeders installed. Otherwise these mills remained unchanged.

Two Dorr rake classifiers operate in closed circuit with the primary compartments of the two mills. The classifiers are mounted on a structure above the mills, the primary compartments' discharge being elevated to them by Wilfley centrifugal pumps and the classifier oversize being returned by gravity to the auxiliary scoops of the primary compartment, which reintroduce this circulating load of oversize into the primary for further grinding. The classifier overflow, or finished primary material, flows by gravity into the sump which also receives the discharge from the secondary compartment of the mill.

Two Dorr bowl classifiers operate in closed circuit with the secondary compartments of the two mills. These bowl classifiers also are mounted above the compeb mills. The discharges from the secondary compartments and the overflows from the primary classifiers are pumped from their common sumps to the secondary bowl classifiers. The oversize circulating loads from these bowl classifiers gravitate to the feed sumps of the secondary compartments from which they are picked up by scoops and reintroduced into the secondaries for further grinding. The finished material overflows from the bowl classifiers and gravitates to a Dorr traction thickener, outside the building.

The dilute "pulp" or slurry from the grinding department is settled in this thickener to a density approaching that of cement slurry produced in the conventional manner.

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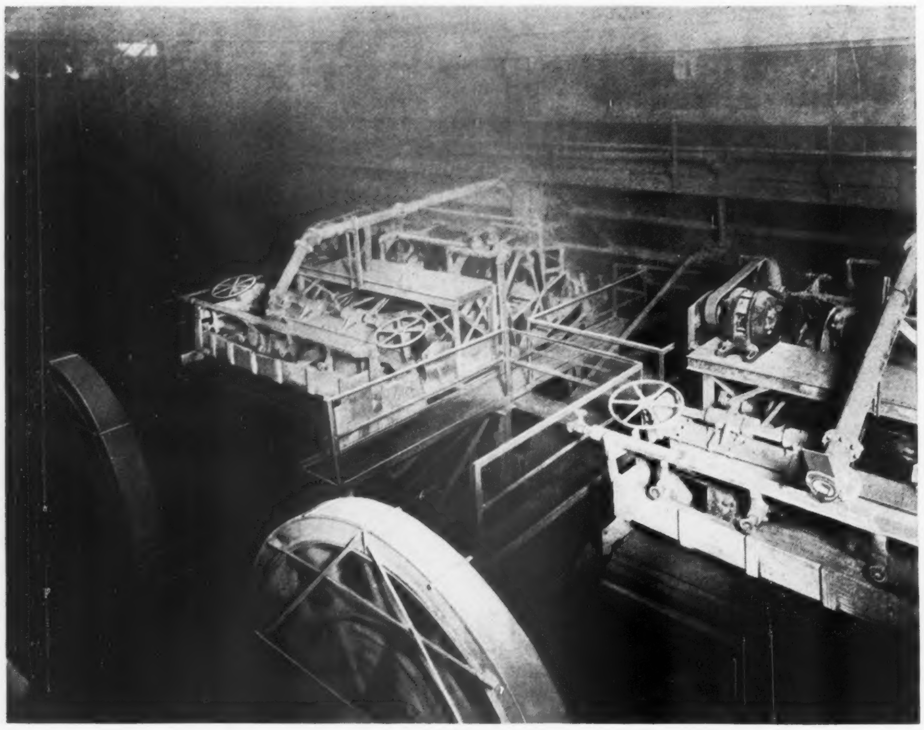
*Based on a statement recently issued by Dewey Portland Cement Co. and published in ROCK PRODUCTS by permission of H. F. Tyler, first vice-president in charge of operations at Davenport, Ia.



Primary classifiers operating in closed circuit with coarse grinding compartments of compeb mills

It is removed continuously, corrected to have the desired lime content in slurry mixers, and then dewatered on Oliver-United American disc type vacuum filters. The excess water in the original pulp leaves the thickener as an overflow product containing appreciably less suspended solids than the adjoining river into which it is discharged. Obviously it could be reused in the plant were it not for an unlimited supply of water which is available there.

The slurry filtration installation was made a few weeks in advance of the closed-circuit grinding installation. Since it follows the conventional arrangement used elsewhere, no special comments will be made here.

Economies of Operation

The policy of the management in preparing now for the anticipated demands for better quality cement has been more than justified by the results secured from this distinctly different type of fine grinding plant. The manufacturing economies secured, including savings in power, grinding media and fixed charges, are in line with efforts made in other branches of industry in this critical business period to reduce the unit cost of production. The great improvement in the fineness of grinding, the flexibility of an arrangement which permits a wide variation in fineness according to the requirements of the time, and finally the increase in strength of cement, indicated by a few comparative tests, all place the company in a position to supply whatever character of cement may be required now or in the future by its clientele.

In addition to the above very definite improvements in practice, which have a dollars' and cents' value to the company, there is a real satisfaction in knowing that Dewey Portland Cement Co. pioneered a new development in the practice of cement making, which promises to be of considerable value to the industry as a whole in pointing the way to improving the quality of its product.

Operating Results

The comparative operating results presented below represent, unless accompanied by a note to the contrary, average data from the closed-circuit installation during June, July and August, 1930, and average data from the former open circuit installation during the whole of 1929.

CAPACITY — The average output per compeb mill during 1929 was 70.1 bbl. of cement per hour. The average output since changing to closed-circuit grinding has been 167 bbl. per hour, with a maximum of 200 bbl. per hour.

The average capacity increase is accordingly 138.2%.

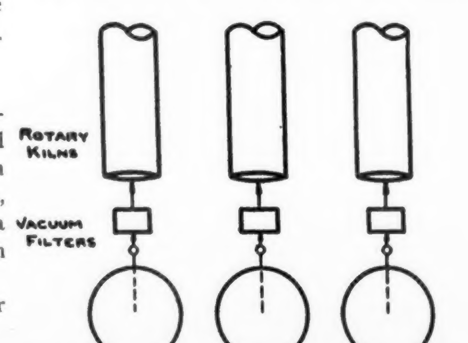
POWER CONSUMPTION—The average unit power consumption for fine grinding during 1929 was 5.5 kw.h. per bbl. At the present time this has been reduced to an average of 3.01 kw.h. per bbl., this latter figure being based on the results obtained from a 12-day test early in September. Of this 3.01 kw.h., 2.26 kw.h. were required for driving the mills and 0.75 kw.h. for driving the classifiers, thickener and circulating pumps.

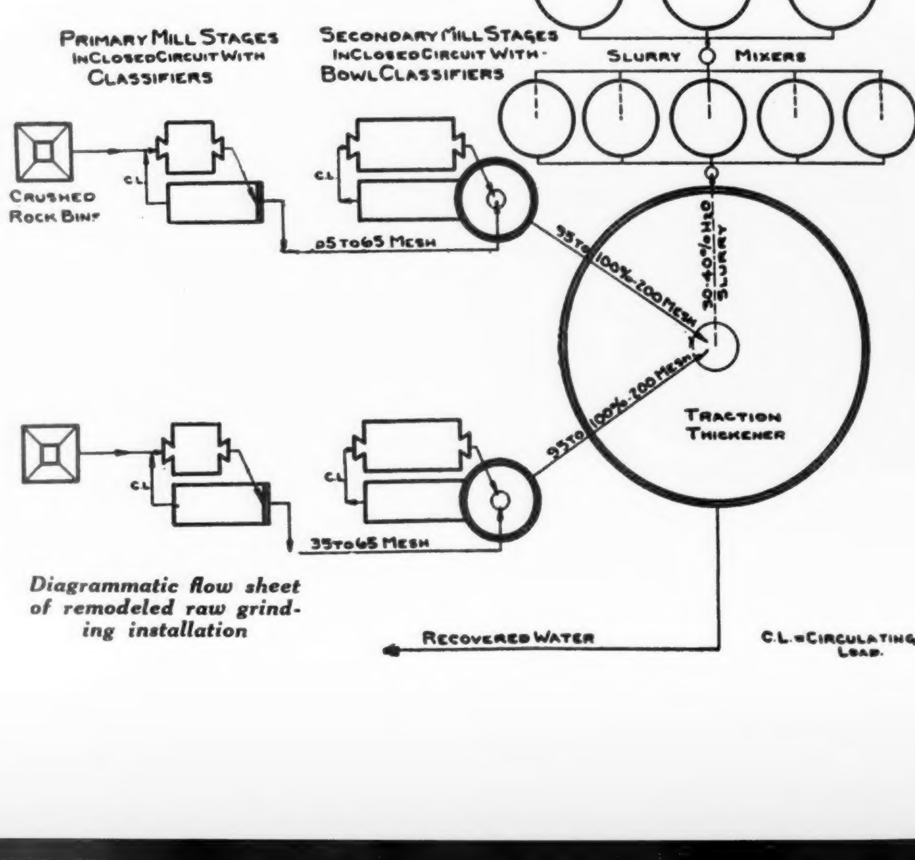
The average power reduction for fine grinding is therefore 45.3%.

GRINDING MEDIA CONSUMPTION—The loss of steel grinding media before the adoption of closed-circuit grinding used to be 0.086 lb. per bbl. in the primary compartments and 0.321 lb. per bbl. in the secondaries. Corresponding figures now are 0.057 and 0.112 lb. per bbl. respectively for the primary and secondary compartments.

The average steel saving is therefore 33.7% in the case of primary balls and 65.1% in the case of secondaries, or an overall saving of 58.5%.

FINENESS OF GRINDING—The average fineness of grinding during 1929 corre-





Diagrammatic flow sheet of remodeled raw grinding installation

sponded to 89% minus 200-mesh and 5% plus 100-mesh. Under closed-circuit conditions the average fineness has been increased to 97.5% minus 200-mesh and nothing on 100-mesh, while at times, when handling only 150 bbl. per hour per mill, the fineness has been held at 99.9% minus 200-mesh and 95% minus 325-mesh.

The table below shows the distribution of sizes as determined by screen analyses, elutriation tests and microscopic examinations of particle sizes.

SIEVE TESTS

	Open circuit		Closed circuit	
	%	% Cum.	%	% Cum.
+20	1.0	1.0	....	....
28	0.25	1.25	....	....
35	0.50	1.75	....	....
48	0.50	2.25	....	....
65	0.75	3.00	....	....
100	2.00	5.00	....	....
200	6.00	11.00	2.6	2.6
325	(not recorded)		8.4	11.0

ELUTRIATION TESTS ON UNDERSIZE FINEST SIEVE

	Av. mesh*	%	% Cum.	%	% Cum.
Jar. 1	340	10.7	21.7	16.6	27.6
Jar. 2	540	7.8	29.5	5.9	33.5
Jar. 3	820	3.4	32.9	6.7	40.2
Jar. 4	1400	8.4	41.3	8.0	48.2
Overflow		58.7	......	51.8	......

A study of these particle size determinations indicates:

(*a*) An elimination of stray oversize, coarser than critical size.

(*b*) A substantial reduction in plus 200-mesh material.

(*c*) Adequate proportions of super-fines.

Strength of Finished Cement

Since the adoption of closed-circuit grinding the calcium carbonate content of the slurry has been held at satisfactory levels. The free lime in the clinker has remained consistently low as indicated by soundness tests on pats and occasional analyses.

The figures given below represent average tensile strengths, before and after the installation. A great deal of attention has not been given so far to building up the strength to the ultimate which can be secured, so these comparative figures indicate only the trend, which is obviously in the right direction.

*Average size of particle determined by microscopic examination.

TENSILE STRENGTH—LB. PER SQ. IN. ON 1:3 MIXES WITH STANDARD OTTAWA SAND

	1 day	7 days	28 days
Open circuit Jan., Feb., Mar., Apr.	128	330	430
Closed circuit June, July, Aug.	178	356	451

Still higher strengths are expected.

Kiln Capacity

As a result of these changes the output of these kilns has been increased as shown below:

Open-circuit grinding, without filters, 1929—4600-4800 bbl. per day.

Open-circuit grinding, with filters, 1930—5400-5600 bbl. per day.

Closed-circuit grinding, with filters, 1930 6600 bbl. per day.

Filter Installation

The filter installation consists of six Oliver-United, American type filters with discs 12 ft. 6 in. in diameter, two 6-disc units on 12 discs over each kiln giving a total filter area of 2400 sq. ft. per kiln. Vacuum is maintained by three 23 in. by 10 in. "Duplex," Chicago Pneumatic Tool Co., synchronous motor-driven vacuum pumps, two of which handle the load, the third being kept as a spare. The filter installation is arranged in the usual way so that a belt conveyor carries the filter cake from each double unit to the feed screw which puts it into the kiln.

Before the installation of the filters the three 11-ft. by 175-ft. kilns were operating on slurry of 36% moisture content, with a total production of 4500 bbl. and a fuel consumption of 135 lb. of coal per bbl., and it was expected that the installation would give a plant capacity of 6000 bbl. per day, or 2000 bbl. per kiln per day, with a fuel consumption of 100 lb. of coal per bbl. However, the plant was only operated in this way with the filters a few weeks before the installation of the closed-circuit grinding equipment, so that there was hardly time enough to reach the best operation under the new conditions, although a capacity of 5600 bbl. was reached, with a fuel consumption of approximately 110 lb. per bbl.

Since the installation of the closed-circuit grinding equipment, the plant output has been increased to 6600 bbl. per day, 2200 bbl. per kiln per day, but the fuel rate was increased to a range of 120 to 130 lb. per bbl. This increase in fuel ratio of 10 to 20 lb. per bbl. can certainly not be charged to the closed circuit grinding, but is probably due to forcing the kiln production, as 2200 bbl. per kiln is perhaps 200 bbl. more than kilns of this size might be expected to produce on filter cake without forcing.

Operating Data on Filters

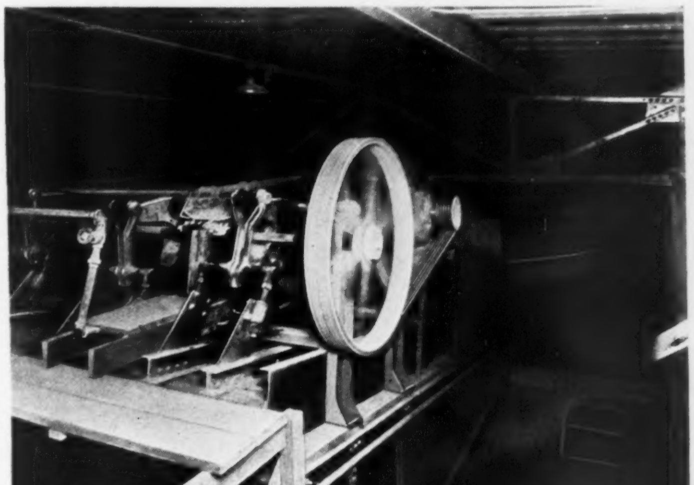
The operation under the three conditions is shown in the table below:

	Open circuit without filters	Open circuit with filters	Closed circuit with filters
Slurry moisture	36%	36-40%	45%
Filter cake moisture	....	18%	19-20%*
Plant output	4500	5600	6600
Fuel rate	135	110	120-130

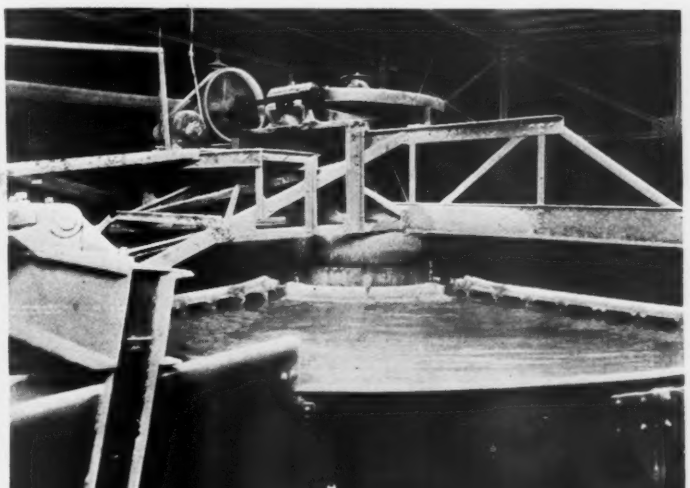
*The increase in filter cake moisture was due to speeding up the filters to handle 45% slurry and 6600 bbl. per day, whereas the plant was installed to handle 40% slurry and 6000 bbl. per day.

Gypsum Association Opens New York Office

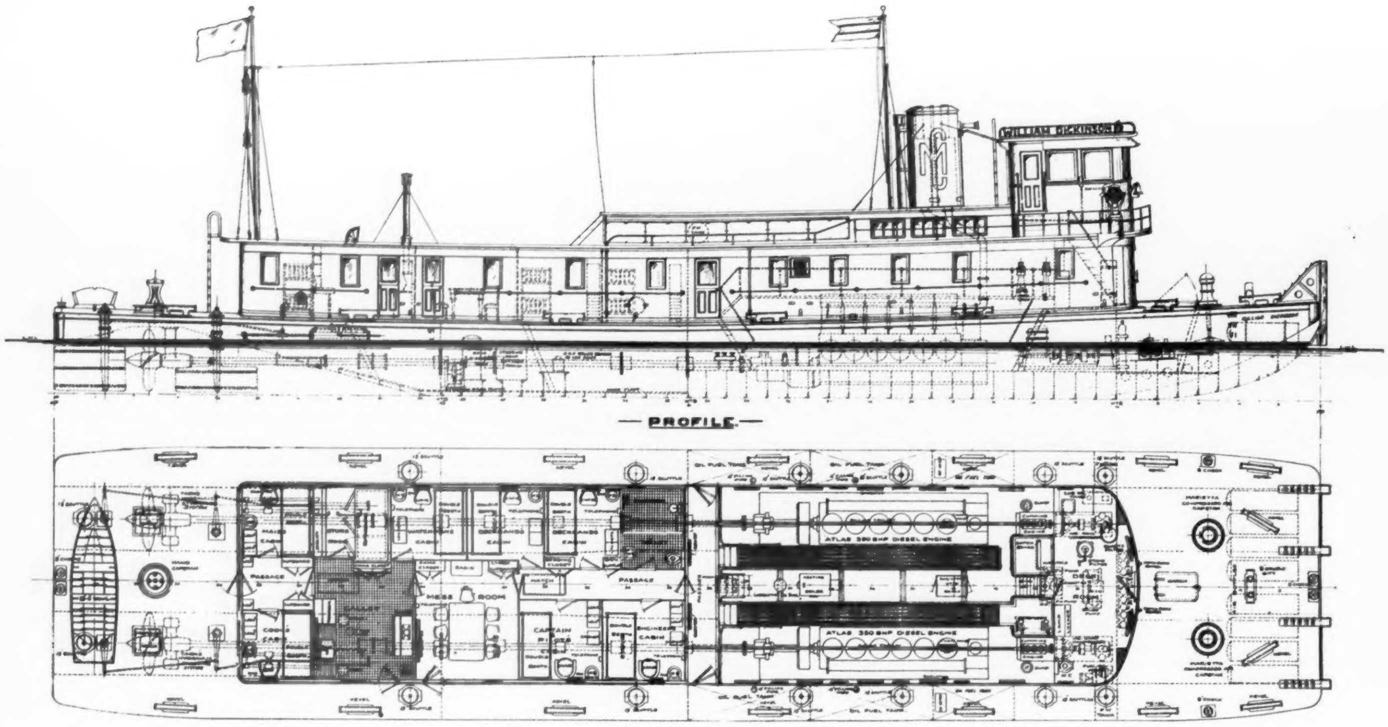
THE GYPSUM ASSOCIATION, which was recently organized in Chicago, with offices at 211 West Wacker Drive, announces the opening of a New York office located at 11 West 42nd street, with J. Kent Smith as district engineer.



Discharge end of bowl classifier showing oversize returned to fine grinding compartment of compeb mill for further reduction



Bowl classifiers operating in closed circuit with fine grinding compartments of compeb mills overflowing finished material to thickener



Profile and main deck of the "William Dickinson," recently completed for the Marquette Cement Mfg. Co.

Marquette Has New Tow Boat

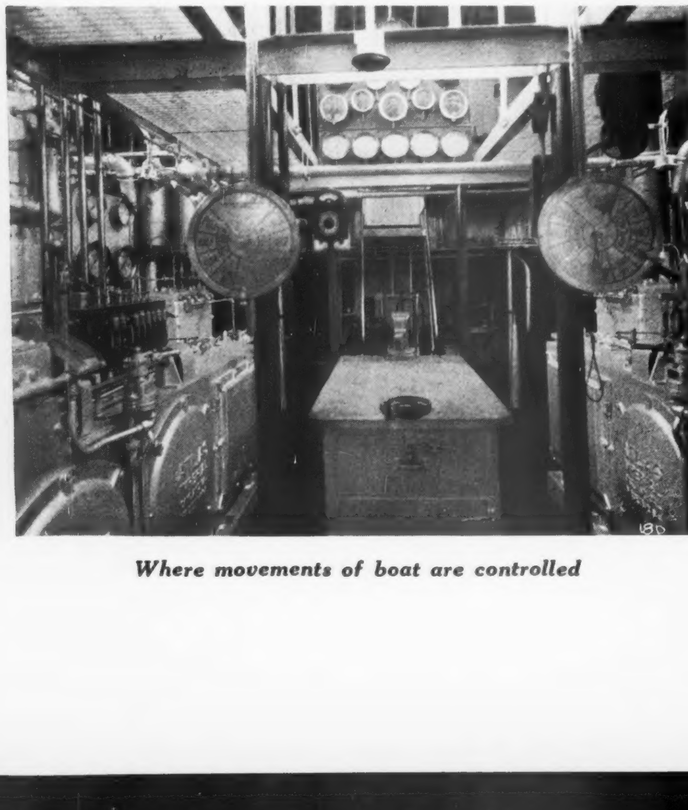
THE LATEST ADDITION to the fleet of vessels used in the transportation of bulk cement on the Mississippi river and tributaries is the Diesel-engine tug boat, *William Dickinson*, recently completed for the Marquette Cement Manufacturing Co., Chicago, Ill., and especially designed for towing bulk cement barges between the Cape Girardeau, Mo., plant and the storage and packing plants at St. Louis, Mo., and Memphis, Tenn.

The vessel is of the most modern design and construction with a number of interesting features, and will be used to tow the four self-unloading barges which the company put into service last year. These tow barges have a carrying capacity of about 5000 bbl. of cement each, and are equipped with the Fuller-Kinyon pumping system, by which the aërated cement is pumped ashore through pipes to the storage silos, the electric power being received from shore.

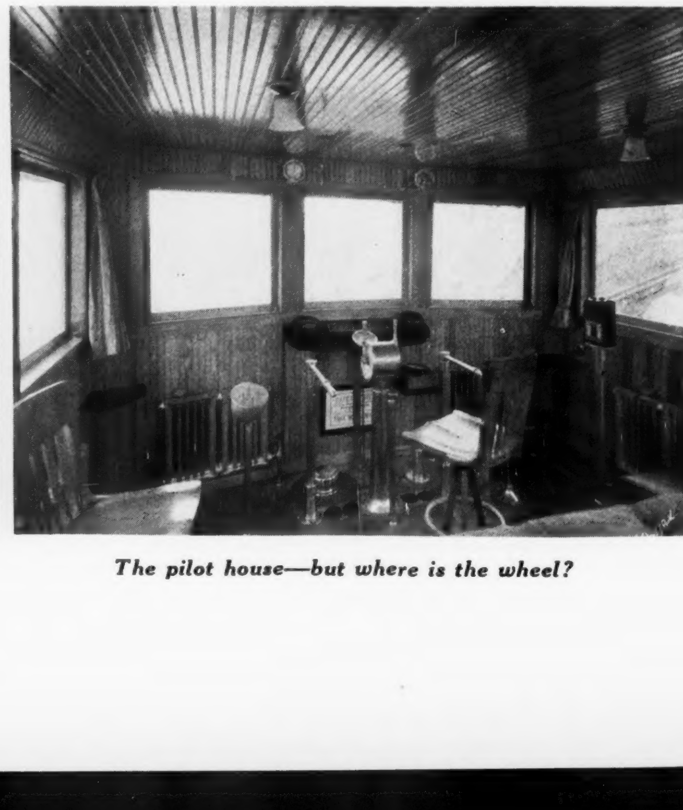
The tug *William Dickinson* is 125 ft. long by 26 ft. beam, and 7 ft. molded depth, and is powered with two Atlas-Imperial six-cylinder, Diesel engines, developing 350 hp. each at 225 r.p.m. The engines are connected to the propeller shafts through air-operated clutches, adjusted to slip at a certain overload, and are controlled and operated through a new hydro-pneumatic control lever designed by the engine builders.

The solid, four-bladed, semi-steel twin propellers are 6 ft. in diameter with a pitch of 63 in. Double cast-iron rudders are used, forward and aft of each propeller, which are operated by hydro-pneumatic twin steering gear with provision for operating either set independently of the other. The usual wheel for manual operation of the rudders is not included in the pilot house equipment, but instead steering is done with lever controls synchronized with the helm angles.

The hull is of steel construction with a modified scow bow and a square stern with rounded corners. The under-water portion of the stern is unlike the usual curved and rounded shape in that it is straight sided



Where movements of boat are controlled



The pilot house—but where is the wheel?

The "William Dickinson" on the Mississippi river

and flat topped to facilitate the easy entrance and discharge of the water to the propellers. This design was used to increase the effectiveness of the propellers and cut down the swirling action imparted to the water at this point, to improve the handling and steering and to simplify construction.

The auxiliary equipment includes two small Diesel engines, each direct-connected to a small Ingersoll-Rand air compressor and a 12½-kw. generator, which furnish electric power and compressed air for operating the main engines, clutches, etc.

The deck house and pilot house are of steel, attractively finished, and with every provision made for the comfort of the crew. Included in the equipment is a water filtration and treatment system, heating system, refrigerating system, intercommunicating telephone system and radio receiving apparatus. The tug was constructed under the supervision of the American Bureau of Shipping and is classified in the highest rating for river service. A 4-ft. by 6-ft. stack houses Maxim silencers for engines.

The boat was constructed by the Marietta Manufacturing Co., Point Pleasant, W. Va., from designs made by T. B. Tarn, naval architect, Pittsburgh, Penn.

Plant to Be Rebuilt

THE Biloxi Grit Co., East Beach Street, Biloxi, Miss., plans erection of a two-story, oyster-shell, crushing plant, 30 x 120 ft., to replace a mill recently destroyed by fire, installation to include electric-operated equipment, screens, transmission equipment, etc., to cost close to $40,000.

Brazilian Cement Manufacturer Comments on Industry

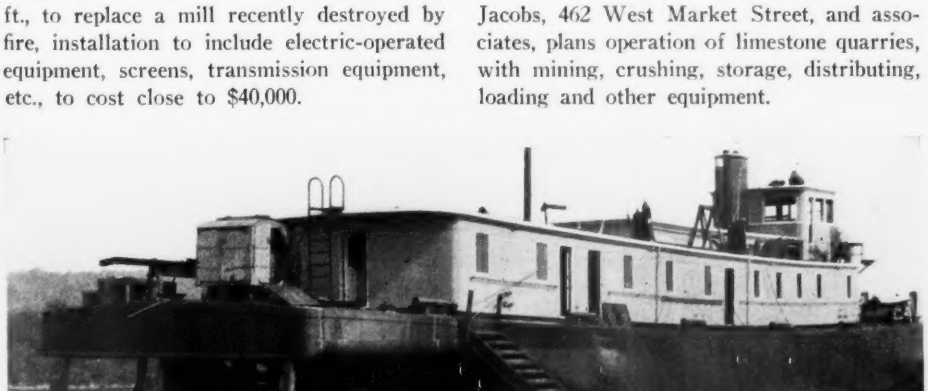
A. H. DICK, vice-president of the Brazilian Portland Cement Co., who recently arrived here from Brazil, looks to trade gain and further development of American enterprises as the results of the recent triumph of the revolution in Brazil.

Mr. Dick, who has been in business in Brazil since 1915, stated that politics have been dominant in virtually all business transactions of the past, and that with the new system being established in Brazil by Dr. Vargas, the recently appointed provisional president, the new government will take itself out of business to an extent hitherto unknown in Brazil.

Mr. Dick stated that foreign interests, in order to gain any headway in Brazil in the past, had always to consider and consult government officials and influential politicians before taking any definite steps. The government not only controlled but used as political instrument practically all the systems of communication and transportation and it regulated strictly the coffee trade upon which Brazilian economic conditions hinged.—*Wall Street* (New York) *Journal.*

New Pennsylvania Crushed Stone Enterprise

THE Jacobs Stone Products Corp., York, Penn., recently chartered by G. Oscar Jacobs, 462 West Market Street, and associates, plans operation of limestone quarries, with mining, crushing, storage, distributing, loading and other equipment.



At one of the Marquette company's docks

James S. Van Middlesworth

SUPPLEMENTING the brief notice of the death of James S. Van Middlesworth, of the Lawrence Portland Cement Co., in ROCK PRODUCTS, November 22, we publish the following about his life and work:

Entering the employ of the Lawrence company when a young man of 17, he filled various positions of increasing responsibility until ten years later when the Lawrence Portland Cement Co. was incorporated under the laws of Pennsylvania, Mr. Van Middlesworth had so thoroughly mastered the intricacies of cement manufacture and was so highly esteemed by the management that he was elected a director and chosen as secretary of the new organization, in which capacities he served until the time of his death.

Mr. Van Middlesworth married Miss Carrie Strickland, daughter of the late Dr. and Mrs. W. Strickland of New Brunswick. Dr. Strickland was a former pastor of the First Methodist church.

Besides his wife, Mr. Van Middlesworth is survived by two brothers, J. Henry Van Middlesworth, Northampton, Penn., who also holds a responsible position with the Lawrence Portland Cement Co., and T. Wilson Van Middlesworth, of New Brunswick, N. J., treasurer of the Public Service Corp. of New Jersey, and one sister, Mrs. Ida Dickey, also of New Brunswick.

For many years Mr. Van Middlesworth was clerk of the Suydam Street Reformed church and was active in Sunday school work. He was also a member of Union Lodge, F. & A. M., the Laurence Brook Country club and of the Y. M. C. A.

Montana Graphite Find

BEAVERHEAD COUNTY, Montana, has within its confines one of the finest graphite deposits in the United States, L. F. Frink, Butte mining engineer, told members of the Beaverhead Mining Association recently.

The deposit is located about 15 miles west of Dell and is owned by the National Carbon Co.—*Butte* (Mont.) *Post.*

Editorial Comment

OUR PLATFORM

¶ Greater Economy of Production; the Best in Machinery, Control Equipment; High Wages; Perfect Co-ordination. ¶ Comprehensive Organization of Industry for Research, Promotion. ¶ Retirement of the State from Competition with Private Business. ¶ Active Participation of Business Men in the Business of Government. ¶ The Promotion of Safety and Welfare of the Industry's Employes.

Rock Products Loses Another Subscriber

The editorial, "A Stitch in Time Saves Nine," published in the October 11 ROCK PRODUCTS, has had wide distribution. The editorial, dealing with the prospects of a projected cement plant in Mississippi, concluded that the project should be carefully investigated by local investors before they put put up their money; at the same time stating a few facts about the present status of the cement industry in that section. Our editorial suggestion was that prospective investors should discover and examine *the facts:* and by facts were meant "actual happenings in time or place," to use the dictionary meaning of the term.

Hence the communication below, received from Aman Moore, president of the Cement Securities Co., Ltd., Los Angeles, Calif., merits a reply, since there is evidently a basic misunderstanding of our position on his part. The letter is:

"With reference to the enclosed reprint of your editorial, kindly refer to previous correspondence we have had in the past regarding the policy of your paper in attempting to regulate the building of new cement plants in various parts of the United States. It is quite evident that you are attempting to set yourself up as dictator and adviser as to where, how and when cement plants shall and shall not be built at various points in the country. Can you not see that such attitude on your part is an attempt to set yourself up as a dictatorial or advisory body, which is entirely without the province of a journalist or newspaper publisher?

Repeating some of the statements in my previous correspondence, I venture to say that 90% of the plants in the United States are absolutely obsolete and are producing a cement that has apparently satisfied the public for the last 40 years. The question of cement manufacturing, as well as that of other manufacturing industries, is one of self-preservation, or survival of the fittest, just the same as it is among the animals. If new plants can be built, taking advantage of new discoveries during the past five years; if they can produce a product far superior to that of their competitors and at a cheaper price, then is it not proper for them to do so, regardless of the fact that going concerns already operating in any particular district are operating 50% capacity only? New mills are looking out for themselves and what they can accomplish, and are not interested in what effect or loss it may have on some other cement plants that should have been scrapped many years ago as junk piles just the same as old worn-out automobiles are junked after a certain amount of wear and tear.

The question of market capacity is the same one that has been used for the past 40 years or more. There has never been a time during that period when there was room in any one particular locality anywhere in the United States for a new plant, providing the market conditions were measured from the product as against the consumption. In spite of this fact many new plants have been built and the cement industry has continued to progress. If the fossilized policy which you advise had been followed, then I presume we would be today importing the largest part of our cement, as no new plants would have been built.

In trying to give free advice to the people of any community you will find that such advice is not needed. There are always competent men in every community who can pass upon these points themselves, especially when they contemplate the investment of their own money in such new plants.

Some time ago I requested you to discontinue the forwarding your publication to my address and I again repeat this request."

It is quite true that we hope to render service to these rock products industries by acting in an advisory capacity, and there is evidence that these efforts are effective. Perhaps our critic's letter is an excellent proof of this. An adviser being one who gives advice, that is, "view or consideration of a thing; hence, opinion, judgment, prudence, consideration, wisdom, knowledge." Yes, it is our aim to provide all these for our industries; that we may sometimes fall short of our aim is a human weakness common to us all—the dream is always there, even if the reality is sometimes disappointing.

As to the critic's statement that this advice is "entirely without the province of a journalist or newspaper publisher," we can speak only for the business papers or periodicals, of which ROCK PRODUCTS is one. Our record speaks for itself—it has been a factor recently in the formulation of the definition of a legitimate business paper by the Associated Business Papers, Inc. (an association of business paper publishers of which we are a member). This definition states: "It must serve the interests and further the development of a clearly defined field, group or division of industry, trade or profession. It must provide adequate, authoritative expression on all subjects pertinent to its field. It must be free from affiliations or control that may restrict impartial and independent discussion on all matters of interest to its readers. It must assume full responsibility for all its published opinions." Perhaps our overhasty critic has not kept pace with developments in modern industrial journalism. Business papers have become real factors or definite aids in the management of all industry headed by intelligent men, and those business papers that are destined to survive as important factors will become more useful.

The second paragraph of the quoted letter would seem to show that our critic is equally out of touch with modern developments in the portland cement industry, which we regret, because he has been a subscriber

to Rock Products, and one of our main objectives has been to keep subscribers informed of developments.

Old Plants Very Often the Best!

Obsolescence, of course, is a relative thing, and the judgment of any two persons in regard to the total amount of obsolescence in any industry, whether portland cement or otherwise, would rarely be the same. We have repeatedly pointed out in these columns that any discussion of over-production or over-capacity should be qualified by taking into account obsolete plants and equipment which plant owners are wont to include in their estimates of capacity. On the other hand, we know that there is far less obsolescence than some critics claim.

Processes in the portland cement industry have not changed much. The changes and obsolescence that *have* come about are due to the growing size of equipment and machinery, and improvements in automatic or semi-automatic materials handling. Old plants have been and will be revamped and modernized at less cost than new plants are built. Cement manufacturers know that, generally speaking, the best costs are being attained by some of these older plants that have been kept up-to-date. Every cement manufacturer and every machinery manufacturer knows that cement-mill equipment wears out periodically in a relatively short time, and is periodically replaced with the latest and best.

Therefore, we know, because we keep pace with developments in the industry, that there have been no "new discoveries during the last five years" that have essentially changed the process of cement manufacture, or are of such a nature that an old plant cannot, or has not, taken as much advantage of as a new one possibly could. The older organizations, with experienced personnels, brand prestige, long-established sales contacts, favorable mill locations, etc., are quite able to take care of themselves, even with so-called "old plants," whether critics approve or not. And anyone who proposes to build a new plant and does not give full weight to these considerations, rather than to unfounded reports of revolutionary changes, is not honest with himself—and that is practically what we said in our October 11 editorial "A Stitch in Time Saves Nine."

Rock Products is most decidedly NOT opposed to the building of new plants as a general proposition; but we do think they should always be fully and entirely justified; and we do think that, at this particular time, when economic waste is of national importance, that a new plant almost anywhere would be difficult to justify, if our information as to and knowledge of conditions in the industry are correct. We believe that the problem of balancing actual up-to-date productive capacity with present and prospective demand, is a very vital one to practically every great basic industry today. It is also a most complicated one; and in our opinion, it will not be settled by federal law, or by federal supervision of industry. It will have to be settled by ordinary local business men and producers through a better understanding of their own part in the working out of national business economy, or their better understanding of business philosophy. Therefore, it is Rock Products' function to assist as many as it can reach.

"The question of cement manufacturing, as well as that of other manufacturing industries, is one of self-preservation, or survival of the fittest, just the same as it is among the animals," says Mr. Moore, and with the first part of his statement we entirely agree. Moreover, we have published editorials on this theme. We doubt if, down in his heart, any red-blooded American business man wants it otherwise. Instinctively, we hate paternalism, love individualism, and fervently desire equality of opportunity for all. And we have enough sporting instinct to want to win on our own merits.

But we do not assent to the statement that "survival of the fittest is just the same as it is among the animals." For while man is an animal, he is generally credited with being an intelligent one, somewhat removed from the brute; and an intelligent man does not blindly follow his animal instincts, particularly in his business life. Just as we have outgrown dueling and other forms of personal combat to settle differences of opinion, so we are gradually being weaned away from other brutal methods of competition. Business men in all lines are beginning to appreciate that competitors can compete according to rules of fair play in business as well as in sports; and that the desirable parts of competition thus can be preserved for the benefit of the public, without the wholesale destruction of property, business and character that would accompany the jungle kind of competition "among the animals."

Not merely because we aim primarily to serve our industries, but because we consider ourself civilized and a worker for the public welfare, we intend to do our utmost to urge the tempering of unbridled, brutal, destructive competition, through educating and "advising" our readers. And any discussion of competition and the voluntary control of production in the interests of national economy inevitably raises the question of unlicensed new plants. Who is going to pass on their necessity or desirability? We certainly hope the government or any other central authority will never be called upon to do this. We feel quite sure that this determination will, as always, devolve upon local investors and bankers. Our hope is that they will become so well versed in economic and business philosophy, with so large an outlook upon an industry as a whole, that they will make wise decisions. In so far as we can, with the expert knowledge of our industries at our disposal, we are going to afford them every assistance possible. We know that other business journals worthy of the name will do likewise for their particular fields. If such advice will not be needed, we will be glad; for it will mean that these local business men are already doing for national economy what economists earnestly hope can be done to prevent depressions like the present one.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	12- 2-30	94½	95½	
Alpha P. C. new com.	12- 1-30	16½	16⅞	50c qu. Jan. 24
Alpha P. C. pfd.[2]	11-29-30	117	....	1.75 qu. Dec. 15
American Aggregates com.	12- 2-30	11	15	75c qu. Mar. 1
Am. Aggr. 6's, bonds	12- 2-30	75	84	
American Brick Co., sand-lime brick	10- 6-30	4½	....	25c qu. Feb. 1
American Brick Co. pfd.	12- 1-30	51½	53½	50c qu. May 1
Am. L. & S. 1st 7's[29]	11-18-30	96	....	
American Silica Corp. 6½'s[49]	12- 2-30	No market		
Arundel Corp. new com.	12- 2-30	41	....	75c qu. Oct. 1
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)*	12- 2-30	No market		
Beaver P. C. 1st 7's[20]	12- 1-30	93	96	
Bessemer L. & C. Class A[4]	11-28-30	25	30	75c qu. Nov. 1
Bessemer L. & C. 1st 6½'s[4]	11-28-30	93	95	
Bloomington Limestone 6's[29]	11-18-30	52	56	
Boston S. & G. new com.[47]	11-29-30	15	18	40c qu. Oct. 1
Boston S. & G. new 7% pfd.[47]	11-29-30	45	50	87½c qu. Oct. 1
California Art Tile A	11-28-30	2	5½	43¾c qu. Mar. 31
California Art Tile B[5]	11-28-30	1¾	....	20c qu. Mar. 31
Calaveras Cement com.	11-28-30	....	12	
Calaveras Cement 7% pfd.	11-28-30	....	83	1.75 qu. Oct. 15
Canada Cement com.	12- 1-30	14⅛	15	
Canada Cement pfd.	12- 1-30	90½	....	1.62½ qu. Dec. 31
Canada Cement 5½'s[43]	11-28-30	99¾	100½	
Canada Cr. St. Corp. bonds[52]	11-29-30	94½	97¼	
Certainteed Prod. com.	12- 1-30	3¼	3⅜	
Certainteed Prod. pfd.	12- 1-30	15	19	1.75 qu. Jan. 1
Cleveland Quarries	12- 1-30	60	65	75c qu. 25c ex. Dec. 1
Columbia S. & G. pfd.	12- 1-30	80	89	
Consol. Cement 1st 6½'s, A	11-18-30	70	75	
Consol. Cement. 6½% notes	12- 2-30	50	60	
Consol. Cement pfd.[29]	11-18-30	....	35	
Consol. Oka S. & G. 6½'s[12] (Canada)	11-28-30	99	101	
Consol. Rock Prod. com.[9]	11-28-30	1	2	
Consol. Rock Prod. pfd.[9]	11-28-30	9	11	43¾c qu. June 1
Consol. Rock Prod. units	12- 1-30	8	10	
Consol. S. & G. pfd. (Can.)[43]	11-28-30	78½	80	1.75 qu. Nov. 15
Construction Mat. com.	12- 1-30	9	10½	
Construction Mat. pfd.	12- 1-30	33½	34	87½c qu. Nov. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	11-28-30	85	93	
Coosa P. C. 1st 6's[29]	10-21-30	50	55	
Coplay Cem. Mfg. 1st 6's[40]	12- 1-30	95	....	
Coplay Cem. Mfg. com.[40]	12- 1-30	10	....	
Coplay Cem. Mfg. pfd.[40]	12- 1-30	60	....	
Dewey P. C. 6's (1930)[30]	12- 2-30	99	....	
Dewey P. C. 6's (1931-37)[30]	12- 2-30	99	....	
Dolese & Shepard	12- 1-30	....	66	$2 qu. Oct. 1
Dufferin Pav. & Cr. Stone com.	12- 1-30	....	13	
Dufferin Pav. & Cr. Stone pfd.	12- 1-30	....	80	1.75 qu. Oct. 1
Edison P. C. com.[39]	11-28-30	50c	....	
Edison P. C. pfd.[39]	11-28-30	2½	....	
Giant P. C. com.[2]	11-29-30	5	15	
Giant P. C. pfd.[2]	11-29-30	15	25	1.75 s.-a. Dec. 15
Gyp. Lime & Alabastine, Ltd.	12- 1-30	13¼	13⅜	37½c qu. Oct. 1
Gyp. Lime & Alab., Ltd., pfd.	11-17-30	....	15	
Hermitage Cement com.[11]	11-29-30	25	35	
Hermitage Cement pfd.[11]	11-29-30	80	90	
Ideal Cement, new com.	12- 1-30	48	50	75c qu. Oct. 1
Ideal Cement 5's, 1943[33]	11-28-30	100	101	
Indiana Limestone units[29]	11-18-30	....	80	
Indiana Limestone 6's	12- 1-30	54	54½	
International Cem. com.	12- 1-30	58	59	$1 qu. Dec. 31
International Cem. bonds 5's	12- 1-30	97⅞	98	Semi-ann. int.
Iron City S. & G. bonds 6's[46]	11- 1-30	90	93	
Kelley Is. L. & T. new stock	12- 1-30	35½	39½	62½c qu. Oct. 1
Ky. Cons. St. com. V.T.C.[48]	11-28-30	5	8	
Ky. Cons. Stone 6½'s[48]	11-28-30	85	90	
Ky. Cons. stone com.[48]	11-28-30	5	8	
Ky. Cons. Stone pfd.[48]	11-28-30	75	85	$1.75 qu. Nov. 1
Ky. Rock Asphalt com.[11]	11-29-30	5	10	40c qu. Oct. 1
Ky. Rock Asphalt pfd.[11]	11-29-30	50	65	1.75 qu. Dec. 1
Ky. Rock Asphalt 6½'s[11]	11-29-30	80	90	
Lawrence P. C.[2]	11-29-30	54	62	$1 qu. Sept. 30
Lawrence P. C. 5½'s, 1942[2]	11-29-30	86½	89	
Lehigh P. C.	12- 1-30	15½	18	25c qu. Feb. 2
Lehigh P. C. pfd.	12- 1-30	100	101	1¾% qu. Jan. 2, 1931
Louisville Cement[48]	12- 1-30	225	....	
Lyman-Richey 1st 6's, 1932[13]	11-28-30	97	100	
Lyman-Richey 1st 6's, 1935[13]	11-28-30	97	100	
Marblehead Lime 6's[14]	11-28-30	80	85	
Marbelite Corp. com. (cement products)	11-29-30	....	3	
Marbelite Corp. pfd.	11-29-30	....	18½	50c qu. Oct. 10
Material Service Corp.	12- 2-30	16	18	50c qu. Dec. 1
McCrady-Rogers 7% pfd.[22]	11-28-30	49	51	
McCrady-Rogers com.[22]	11-28-30	15	20	
Medusa Portland Cement	12- 1-30	....	80	1.50 Oct. 1
Mich. L. & C. com.[6]	11-29-30	25	....	
Missouri P. C.	12- 2-30	27	28	50c qu. & 50c ex. Nov. 1
Monolith Portland Midwest[9]	11-28-30	2½	3	
Monolith bonds, 6's[9]	11-28-30	80	85	
Monolith P. C. com.[9]	11-28-30	4½	5½	40c s.-a. Jan. 1
Monolith P. C. pfd.[9]	11-28-30	3½	4½	40c s.-a. Jan. 1
Monolith P. C. units[9]	11-28-30	12½	14	
National Cem. (Can.) 1st 7's[43]	11-28-30	99½	100¼	
National Gypsum A com.	12- 1-30	4	5	
National Gypsum pfd.	12- 1-30	25	27	
Nazareth Cement com.[25]	11- 3-30	17	....	
Nazareth Cement pfd.[26]	11- 3-30	97	....	
Newaygo P. C. 1st 6½'s[29]	11-18-30	100½	....	
New Eng. Lime 1st 6's[14]	11-28-30	50	60	
N. Y. Trap Rock 1st 6's	12- 1-30	98	....	
N. Y. Trap Rock 7% pfd.[36]	11-19-30	95	....	1.75 qu. Oct. 1
North Amer. Cem. 1st 6½'s	12- 2-30	54½	....	
North Amer. Cem. com.[29]	12- 2-30	2½	3	
North Amer. Cem. 7% pfd.[29]	12- 2-30	15	19	
North Shore Mat. 1st 5's[15]	12- 2-30	95	....	
Northwestern States P. C.[37]	11- 1-30	110	120	$2 Apr. 1
Ohio River Sand com.	12- 1-30	....	15	
Ohio River Sand 7% pfd.	12- 1-30	....	98	
Ohio River S. & G. 6's[16]	11-29-30	87	90	
Oregon P. C. com.[9]	11-28-30	....	14	
Oregon P. C. conv. pfd.[29]	12- 1-30	83	86	
Oregon P. C. pfd.[9]	11-28-30	....	95	
Pacific Coast Aggr. com.[50]	11-28-30	2	....	
Pacific Coast Aggregates pfd.	12- 1-30	3	5	
Pacific Coast Cement 6's[5]	11-28-30	74½	75	
Pacific P. C., new com.	11-28-30	....	17	
Pacific P. C., new pfd	11-28-30	68½	75	1.62½ qu. Oct. 4
Pacific P. C. 6's[5]	11-28-30	97½	....	
Peerless Cement com.[21]	11-28-30	6	7	
Peerless Cement pfd.[21]	11-28-30	70	80	1.75 Oct. 1
Penn.-Dixie Cement com.	12- 1-30	3½	4⅜	
Penn.-Dixie Cement pfd	12- 1-30	20	27	
Penn.-Dixie Cement 6's	12- 1-30	73	....	
Penn. Glass Sand Corp. 6's	11- 5-30	99½	101	
Penn. Glass Sand pfd	11- 5-30	100	....	1.75 qu. Oct. 1
Petoskey P. C.	12- 1-30	5½	6½	15c qu. Apr. 1
Port Stockton Cem. com.[5]	11-28-30	No market		
Riverside Cement com.[5]	11-28-30	10	12	
Riverside Cement pfd.[5]	11-28-30	75	80	1.50 qu. Nov. 1
Riverside Cement, A[20]	12- 1-30	11	14	31¼c qu. Nov. 1
Riverside Cement, B[9]	11-28-30	2	....	
Roquemore Gravel 6½'s[17]	11-29-30	98	100	
Santa Cruz P. C. com.	11-28-30	85	....	$1 qu. Oct. 1
Schumacher Wallboard com.	11-28-30	8½	10	
Schumacher Wallboard pfd.	11-28-30	18	23½	50c qu. Nov. 15
Southwestern P. C. units[44]	11-28-30	240	....	
Standard Paving & Mat. (Canada) com.	12- 1-30	15	15½	50c qu. Nov. 15
Standard Paving & Mat. pfd.	12- 1-30	....	79¾	1.75 qu. Nov. 15
Superior P. C., A	11-28-30	31⅛	35	27½c mo. Dec. 1
Superior P. C., B	11-28-30	8	10	25c qu. Sept. 20
Trinity P. C. units[37]	11- 1-30	130	140	
Trinity P. C. com.[37]	11- 1-30	30	40	
Trinity P. C. pfd.[29]	10-21-30	107	110	
U. S. Gypsum com.	12- 1-30	40½	41	40c qu. & 50c ex. Dec. 31
U. S. Gypsum pfd.	12- 1-30	121	124	1.75 qu. Dec. 31
Warner Co. com.[16]	11-29-30	32	33	50c qu. Jan. 15
Warner Co. 1st 7% pfd.[16]	11-29-30	95	98	1.75 qu. Jan. 1
Warner Co. 1st 6's[8]	12- 2-30	96½	98	
Whitehall Cem. Mfg. com.[36]	11-19-30	80	....	
Whitehall Cem. Mfg. pfd.[36]	11-19-30	50	....	
Wisconsin L. & C. 1st 6's[15]	12- 2-30	95	....	
Wolverine P. C. com.	12- 1-30	3⅝	3¾	15c qu. Nov. 15
Yosemite P. C., A com.[9]	11-28-30	2	3	

*See inactive securities below.

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler Reading & Co., Youngstown, Ohio. [5]Smith, Camp & Co., San Francisco, Calif. [6]Frederic H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simon & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [24]A. B. Leach & Co., Inc., Chicago, Ill. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [29]Bank of Republic, Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago, Ill. [33]Boettcher Newton & Co., Denver, Colo. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co., Los Angeles, Calif. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Wise, Hobbs & Arnold, Boston. [48] E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co., Chicago, Ill. [50]Martin Judge Co., San Francisco, Calif. [51]Hemphill, Noyes & Co., New York City. [52]Nesbitt, Thomson & Co., Montreal.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
Atlantic Gypsum Products 1st 6s, 1941 ($28,000)[4]	$7400 lot	....
Consolidated Cement com. v.t.c., 3220 shs.[1]	1½ per share	....
Universal Gypsum and Lime, 300 shs.[3]	$4 for the lot	....
Universal Gypsum and Lime, 200 shs.[3]	$2 for the lot	....
Holliston Trap Rock Co. com.,[2] 67 shs., per sh.	35	....

[1]Price at auction by Wise, Hobbs & Arnold, Boston. Dec. 18, 1929. [2]Price at auction by R. L. Day & Co., Boston, July 16, 1930. [3]Price at auction by Adrian H. Muller & Son, New York, August 6, 1930. [4]Price at auction by Adrian H. Muller & Son, New York City, November 19, 1930.

Wall Street Reviews U. S. Gypsum Prospects

THE EXTRA DIVIDEND of 50 cents a share on common stock recently declared by directors of the United States Gypsum Co. was the first extra distribution of any kind voted in about two and one-half years. It followed a moderate upturn in earnings during the last 12 months, resulting from betterment in the price situation combined with low-cost operation in the large, new plants completed last year.

In June, 1928, Gypsum directors declared a 10% stock dividend and offered stockholders rights to subscribe to additional stock at $20 a share in the ratio of one additional share for each two shares held. During the following 12 months, earnings shrank sharply because of competitive conditions within the gypsum industry which led to drastic price cutting.

Settlement of patent litigation and improved conditions within the industry enabled Gypsum's net profits in the second half of 1929 to show a light increase over those in the corresponding period of 1928. As a result, despite the poor showing in the first half of 1929, earnings a common share on stock outstanding at the year-end were almost 2.5 times the regular cash dividend rate and earnings on the average amount of stock outstanding during the year were 3.33 times the rate.

Net profit of $2,891,750 in the first half of 1930 showed a further and more marked improvement than in the second half of 1929, and "reasonably satisfactory" profits are in sight for the second half.

Although Gypsum reports earnings only semi-annually, the nine months' net this year is estimated at about $3.40 a common share against $2.24 a share on 1,170,370 shares in the first six months. For the full year, Gypsum is likely to show net profit equal to more than $4 a share on the common stock, which would compare with $3.98 a share on 1,149,290 shares outstanding at end of 1929 and $5.33 a share on the average number of common shares outstanding during that year.

Although an extra dividend of 50 cents a share on the more than 1,200,000 shares now outstanding is almost the cash equivalent of the extra of $1 a share declared in 1927, both the regular and extra cash dividend requirements on the common stock for the year were more than earned first half.

The extra voted this year will require the distribution of $600,000 in cash as against almost $7,000,000 in cash and government securities held by Gypsum on June 30, last.
—*Wall Street* (New York) *Journal.*

DIVIDENDS PAID BY UNITED STATES GYPSUM CO.

	Dividends paid: Regular cash	Dividends paid: Extra cash	Dividends paid: Stock	Net profit	A share	No common shares ($20 par)
1930	$1.60	$0.50	....	....	....	....
1929	1.60	....	....	$5,102,305	$3.98	1,149,290
1928	1.60	....	*10%	6,031,635	7.22	760,436
1927	1.60	1.00	....	7,538,508	10.10	691,198
1926	1.60	3.40	35%	8,375,747	11.35	687,875
1925	1.60	4.00	15%	8,414,117	15.45	506,915
1924	†1.00	5.20	35%	7,166,381	14.96	439,348
1923	.80	....	20%	5,030,922	15.60	295,584
1922	.80	....	10%	3,119,034	12.18	221,552
1921	.80	....	5%	1,703,042	6.16	208,607
1920	.80	....	5%	1,705,211	6.52	197,400

*Stockholders of record June 14, 1928, received rights to subscribe to 380,222 shares of common stock in the ratio of one additional share for each two shares held.

†Regular rate increased from 20 cents to 40 cents quarterly with December payments.

Indiana Limestone Omits Preferred Dividend

THE INDIANA LIMESTONE CO., Bedford, Ind., has omitted the quarterly dividend of $1.75 on cumulative preferred stock due December 1. The company stated that it desired to preserve its present strong financial position pending a revival in building activity, which is expected in the near future.

A. E. Dickinson, president of Indiana Limestone Co., has denied reports from Bloomington, Ind., that Indiana Limestone, Bloomington Limestone Co., and several other concerns were planning a merger.

Arundel Corporation Profit

THE ARUNDEL CORP. (sand and gravel contracting business) Baltimore, Md., reports for ten months ended October 31, 1930, net profit of $2,290,994 after depreciation, taxes, etc., equivalent to $4.65 a share on 492,000 shares of capital stock, comparing with $1,962,721, or $3.98 a share, in corresponding ten months of 1929.

October net profit after depreciation and taxes was $333,894, against $322,025 in October, 1929.

Current assets on October 31, last, were $5,948,915 and current liabilities $378,060.

Recent Dividends Announced

Alpha Portland Cement com. (qu.)	$0.50,	Jan. 24
Alpha Portland Cement pfd. (qu.)	1.75,	Dec. 15
Bloomington Limestone pfd. (qu.)	1.75,	Jan. 1
Canada Cement pfd. (qu.)	1.62½,	Dec. 31
Giant Portland Cement pfd. (semi-annual)	1.75,	Dec. 15
International Cement com. (qu.)	1.00,	Dec. 31
Kentucky Rock Asphalt pfd. (qu.)	1.75,	Dec. 1
Lehigh Portland Cement com. (qu.)	.25,	Feb. 2
Republic Portland Cement pfd. (qu.)	1¾%,	Dec. 1
Warner Co. com. (qu.)	.50,	Jan. 15
Warner Co. first and second pfd. (qu.)	1.75,	Jan. 1

Wall Street Predicts Good Year for Canada Cement

THE Canada Cement Co. for the fiscal year ending November 30 will make a good showing. While the general business depression in the Dominion has adversely affected most other industries, Canada Cement's business has been well maintained, sales running even ahead of the unusually prosperous year, 1929.

For the 12 months ended November 30, 1929, the company reported net income of $1,600,701, equal after 6½% preferred dividends to 38c a share on 600,000 shares no par common stock. This compared with 1928 net income of $1,396,951, or 5c a common share.

The earnings statement for the current fiscal year may not indicate as high a net income as last year, since the company probably will deduct from earnings a portion of expenditures made in improvement of production and distribution facilities.

During the past two years a considerable amount has been expended on renovation of plants. Work of converting the Montreal East plant to a "wet" process has been nearly completed. The Hull, Exshaw, Winnipeg and Port Colborne plants were renovated earlier.

Partly to stimulate export business, which has not shown much progress in recent years, the company has added to its distribution facilities in eastern Canada. Last year storage bins and packing plants were completed at Quebec and Halifax, and this year similar buildings have been constructed at St. John. A new 3500-ton vessel supplies these distributing plants with cement and brings back gypsum from Nova Scotia.

The rapid expansion of the hydro-electric industry in the Dominion, involving construction of a number of huge power plants, has been an important factor in the good business of Canada Cement this year. In addition, several of the provinces have increased their cement-highway mileage, in an effort to attract motor tourists.

Construction projects, now in prospect, will further benefit the company. The $50,000,000 Canadian National terminal in Montreal, now in preliminary stages of construction, the proposed $65,000,000 subway project in the same city, the large amount of construction work involved in the unemployment relief program sponsored by the Ottawa government, and continuation of hydro-electric developments assure considerable business over the next few years.

Handling approximately four-fifths of the total Canadian cement business, Canada Cement cannot help but benefit from the contemplated construction work.

Selling currently on Montreal Stock Exchange at 91, Canada Cement's 6½% preferred stock yields over 7%. The common stock, on which no dividends have yet been paid, is currently quoted around 14.—*Wall Street* (New York) *Journal.*

Cement Manufacturers Change Dealer Relationships

PORTLAND CEMENT MANUFACTURERS representing approximately half the potential production of the industry have severally announced new dealer discounts and distribution arrangements. The new method, it is said, to provide that all transactions between the manufacturer and the dealer be on an outright purchase and sale basis. The dealer is the purchaser and seller, carrying the accounts and assuming full credit responsibility on his sales. As a separate and distinct transaction, the cement company will pay the dealer, at the end of each calendar year, a special service payment of 5c per bbl. on the quantity of cement invoiced to and paid for by the dealer during the calendar year. The service payment will not be made at the time of payment of invoices. It will not be applied against unpaid accounts due from the dealer. Contracts between manufacturers and dealers covering cement for use in specific work will provide for the 5c service payment. In cases where the dealer is unable or unwilling to carry out a complete transaction with a user the cement company will deal directly with the user, the price being the same as to a dealer; but in this event neither the dealer nor the user will receive the 5c service payment.

The only comment we have seen to date is from the *Charlotte* (N. C.) *Observer*, which states:

"Retail dealers of the country who recently had a big fight on their hands as a result of new manufacturers' plans for handling cement are now in another battle as a result of a marketing plan recently announced by some of the largest cement companies of the country, said Victor W. Wheeler, secretary of the Carolinas Association of Retail Lumber Dealers.

"This plan, which does away with the dealer discount heretofore allowed, places all transactions on an outright purchase and sale basis, and quotes the same prices to dealer and contractor except in places where on account of dealer affiliations they do not quote consumer trade, seriously threatens the economic position of the dealers, Mr. Wheeler declared.

"Mr. Wheeler received a telegram from the National Builders' Supply Association asking that each association voice its opinion on the new marketing plan. In answer the following telegram was sent:

"'The Carolina Association has not yet had opportunity to take action on the new marketing plan of some cement manufacturers but after consulting with many of our officers and directors and a great number of dealers we feel that it is the most destructive and mischievous announcement in years. It is the severest blow to the principle of dealer distribution that has been leveled against the industry in a decade. It is a direct refutation of the principles espoused by some of the leading cement manufacturers in their national advertising. The 5c service payment is an insult to legitimate business and no concern can merchandise cement or any other commodity on an approximately 2% margin.

"Southern secretaries will hold a meeting in Chattanooga on December 15 and 16, at which time the new cement marketing plan will be one of the topics discussed.

United States Gypsum Acquires Federal Gypsum

THE PLANT AND PROPERTIES of the Federal Gypsum Co., formerly the Centerville Gypsum Co. of Centerville, Ia., were acquired recently by the United States Gypsum Co. of Chicago, Ill.

The Federal Gypsum Co., formerly owned by J. Norwood of Des Moines, has been recently under the ownership and direction of W. S. Bradley. According to announcement made by U. S. Gypsum officials, the business will be continued as the Federal Gypsum Division, with no change in personnel or management. It is the intention to continue the manufacture and sales of the plaster and lime products now produced by the present company and to expand the business and the diversified lines through the resources of the United States Gypsum Co.

For many years the local gypsum mine has produced a finishing plaster superior to practically all other products of its kind in this country. Under the direction of one of the largest gypsum companies in the United States the possibilities of today's transaction could mean much to this city and community.—*Centerville* (Ia.) *Iowegian.*

More Interest in Montana Zonolite

SINCE placing samples of zonolite in the British geological museum at London, British capitalists have become interested in the company's property at Libby, Mont., and through George Stannard of Kalispell, who has just returned from London, have asked for a price on the property.

At a recent meeting of the Zonolite Co. in Libby, at which two-thirds of the stock was represented, it was voted to submit a price of $3,500,000 both to the United States Gypsum Co. and to English interests.

Representatives of the Gypsum, Lime and Alabastine Co., Ltd., of Canada, which now owns stock in the Zonolite Co., have reported that their organization is interested in acquiring a controlling interest in the property at Libby but have asked for no quotations, according to C. L. Emmons, president of the Zonolite Co.

The Canadian company has been using zonolite in manufacture of several products during the last year and, according to E. N. Alley, general manager of the Zonolite Co., sales to this organization have been increasing.—*Great Falls* (Mont.) *Tribune.*

California Sand Company to Recover Clay and Silica Byproducts

AT A MEETING of the directors and owners of the Olympia sand plant held in Felton, Calif., resolutions were passed that the plant has merged with the Stockton branch. In the future it will be known officially as the Atlas Olympia Co., Ltd., with headquarters in San Francisco. It was further contemplated and resolved by the companies influential financial backing to enlarge, extend and improve the present Felton plant, to install seven to eight lakes, ponds and tanks for the initial step, after which machinery will be installed for the commercial saving of the byproducts which formerly went to waste and heretofore were running into the Zaente creek.

The byproducts, which are a high class silt and silica, are going to be produced for all parts of the state in the manufacture of pottery and chinaware. New railroad tracks are now under construction to accommodate this new industry.

A much larger payroll will result and Olympia will be extensively advertised. At present six new employes have been added to the force, with tractors, steam shovels and scrapers going day and night. Three of the owners are personally supervising the present engineering. They are Walter McMillan, Horatio G. McMillan and Alex C. McMillan.—*Santa Cruz* (Calif.) *Sentinel.*

Permit for New Gravel Plant in Los Angeles Territory Refused

THERE WILL BE no new rock and gravel plant located in the western part of the city of Burbank, Calif.

This was indicated at the meeting of the city council recently by the withdrawal, on the part of Wofle and Weir, of a request for a permit to establish such an institution.

Consequently a petition in the hands of City Clerk Webster, with the names of 53 property owners of that locality, was not necessary to come before the council for further action than to order it filed.—*Burbank* (Calif.) *Review.*

International Cement October Earnings

THE International Cement Corp., New York City, estimates its net profit after federal tax for October at $356,000, compared with $277,000 for October, 1929. Net profit for first ten months of the current year is estimated at $3,803,000, against $3,805,000 in the similar period of last year.

Earnings for October, 1930, are equivalent to 56 cents a share, and for the ten months to $5.98 a share on the 635,763 shares now outstanding. This compares with 44 cents a share for October, 1929, and $6.06 a share for the ten months of 1929 on 627,524 shares then outstanding.

B. F. Affleck Answers Pessimists by Quoting 100-Year-Old Literature

B. F. AFFLECK, president of the Universal Atlas Cement Co., has mailed out a four-page folder entitled "A single breaker may recede but the tide is coming in," which is receiving much favorable comment. A sample is the following from the *Chicago Daily News*:

"Many economists have compared statistics on the current business depression with those of earlier years. It remained for a practical business man, with a broad grasp of world conditions, to look up as well what commentators had said and predicted at the time. B. F. Affleck, shrewd head of the huge cement manufacturing subsidiary of the United States Steel Corporation, had the necessary vision to connect present economic confidence with historical background.

"'A single breaker may recede, but the tide is coming in,' he quotes from Macaulay, the English essayist, during the hard times of 1830. 'On what principle is it that when we see nothing but improvement behind us we are to expect nothing but deterioration before us?'

"Macaulay went further, writing 100 years ago a prophecy of conditions today.

"'If we were to prophesy that in the year 1930 that machines constructed on principles yet undiscovered will be in every house—that there will be no highways but railroads, no traveling but by steam—that our debt, vast as it seems to us, will appear to our great-grandchildren a trifling incumbrance, which might easily be paid off in a year or two—many people would think us insane.'

"Perhaps they would have, but for a 100-year long shot Macaulay came close to the mark. His only error was that he forecast an intense development of rail and interurban in place of the ubiquitous motor car. He concluded:

"'Our rulers will best promote the improvement of the nation by strictly confining themselves to their own legitimate duties—by leaving capital to find its most lucrative course, commodities their fair price, industry and intelligence their natural reward, idleness and folly their natural punishment—by maintaining peace, by defending property, by diminishing the price of law, and by observing strict economy in every department of the state.

"'Let the government do this—the people will assuredly do the rest.'

"Mr. Affleck, without adding other comment of his own, is distributing copies of the essay to his friends."

Winter Work for 30 Men

THE Marquette Cement Manufacturing Co., Chicago, Ill., has undertaken an improvement program which will provide about four months' work for approximately 30 men at its LaSalle, Ill., mills.

New Cement Plant for Louisiana Rumored

DAILY PRESS DISPATCHES and unauthoritative information gleaned locally indicate that the Southern Mineral Co., Winnfield, La., is now negotiating to lease its limestone quarry and plant to a business organization of North Carolina, which new concern will not only furnish rock aggregate for road construction in the state but will add a new unit to the plant by the installation of a cement mill.

Press dispatches from New Orleans of November 17 say: "Gov. Huey P. Long held a series of conferences here recently looking to the reopening of the rock quarries near Winnfield. Crushed stone is needed for the great road construction program.

"We require for state work about 5000 tons of crushed stone a day or a train of 100 cars every 24 hours," said the Governor.

"It is the policy of this administration to use Louisiana materials wherever possible. We want to use our own crushed stone. Why should we buy it from other states when there is an unlimited supply in Winn parish?"

C. P. Couch, vice-president of the Louisiana and Arkansas railroad, which serves the Winnfield territory, was present. O. K. Allen, chairman of the Louisiana Highway Commission; S. M. Beasley, purchasing agent of the state highway board and a group of cement men and road-building experts were at the executive rooms.

"I want to get a cement plant established in Louisiana," said Governor Long.

"There is no better place than around the rock quarries. The cement operators, I think, should take over the quarry in Winn parish and operate it jointly with a large cement plant."—*Winnfield* (La.) *News-American*.

[Evidently the governor had forgotten there was already a cement plant in Louisiana.—Editor.]

Lone Star Cement of Louisiana to Make Improvements

A PROGRAM of improvements, to keep its force of workmen steadily employed at the big plant of the Lone Star Cement Co., Louisiana, on the Industrial canal, New Orleans, La., is nearing completion, it was announced recently by Scott Thompson, vice-president and manager.

Among the improvements has been the installation of an additional huge rotary kiln, 10 ft. in diameter by 374 ft. in length.

"This is believed to be the largest individual unit of moving machinery used in any manufacturing process, and we are sure it is the largest kiln for the manufacture of cement installed in this country, thus making the New Orelans plant a leader in the portland cement industry of the country in this particular type of equipment," said Mr. Thompson.—*New Orleans* (La.) *Times.*

Alton J. Blank Promoted to Vice-President of Landa Cement Subsidiary

ALTON J. BLANK, son of Mr. and Mrs. J. A. Blank of 715 South Sixth Street, Ironton, Ohio, who for several years has been affiliated with the cement industry in Mexico and who two years ago was employed as general superintendent of the Landa Cement Co. of Puebla, Mexico, has been named vice-president and director of

Alton J. Blank

Negociacion de Materials Para Construccion, with headquarters at Mexico City, by the Landa company.

Mr. Blank started his career in Mexico approximately five years ago as chief chemist of the Tolteca Cement Co. and after a little more than two years with that company he received an offer as general superintendent of the Landa company.

Rock Thrown by Blast Kills Quarry Worker

STRUCK on the head with a 2-lb. rock while he sat under a tree eating his lunch, Albert H. Younkin, 37, shovel operator in a quarry at Connelsville, Penn., was fatally injured November 21. He died several hours later in the Connellsville hospital. He left his machine ten minutes before the accident. A blast in another part of the quarry threw the stone 700 ft. in the air Lewis M. Younkin, Hagerstown, Md., is a brother.—*Washington* (D. C.) *Post.*

Foreign Abstracts and Patent Review

German Test Data on Slurry Filters. Gus. Boehm and Desider Steiner state that the rapid adoption of the slurry filter in the American cement industry has proved that it is actually serviceable. There are at least 30 plants in the United States using slurry filters. In Europe only a few small installations have as yet been made. However, after a few quite successful preliminary tests a larger slurry filtering plant was installed about a year ago. Before presenting the test data on this plant, the authors present a general exposition of the design and operation of slurry filters, referring also to the Oliver and Feinc drum filters, and the American or United disc filter. The slurry filter at the German installation under test, is of the Feinc-Imperial type supplied by the Imperial Machine Works, at Meissen. This firm expects soon to produce a filter combined with a drier, for which a German patent application has been made. A dried filter cake of only 2 to 3% moisture content is to be produced with it in one process, from raw slurry of about 40% water content, which constitiutes a complete change from the wet process to the dry process. Air or waste gas of about 200 deg. C. temperature is considered sufficient for drying.

Due to a favorable arrangement of the German cement plant, it was possible to cut out the filter equipment at any time and to connect up the slurry feeding tank with the kiln, so that comparative operating data could be obtained in the same plant. The kiln is of the Unax type, 50 m. (164 ft.) long, 2.7 m. (8.9 ft.) in diameter with an expanded sintering zone of 3.00 m. (9.8 ft.) diameter, lined in the pre-heating zone with 15 cm. (5.9 in.) and in the sintering zone with 25 cm. (9.8 in.) thick chamotte. This kiln is connected in common with two small kilns to one flue gas duct and then to two waste-heat boilers, so that with reference to data on the waste-heat boilers, the waste gases from the small kilns must be considered also.

The two suction-cell filters of 40 sq. m. (430 sq. ft.) filtering surface each, supplied by the Imperial Machine Factory at Meissen, ran originally with a maximum of 40 turns per hour, but for the sake of better drying and reduction in wear, this speed was decreased to 20 turns per hour in the first test and to 26 turns per hour in the second test, which amounts, respectively, to about 200, and 260 kg., output of filter cake per square meter (40 and 52 lb. per sq. ft.) per hour. The authors relate how and how often the various test readings were made to obtain a fair average reading. In the first test emphasis was placed upon saving in coal, and in the second test upon raising the kiln output. The test data on running this plant with and without slurry filters are presented in five tables, from which the following deductions are made: During operation with the slurry filters the kiln output increased 13.6% in Test I and 25.2% in Test II; the saving in coal amounted to 14.9% in Test I and 10.5% in Test II; the heat consumption per kg. of clinker amounted to 1960 kg. cal. in Test I and to 2150 kg. cal. in Test II, as compared to 2410 and 2300 kg. cal. when feeding the kiln with slurry (3528, 3870, 4338 and 4140 B. t. u. respectively per lb. clinker); the waste gas temperature was 95 deg. C. (171 deg. F.) higher in Test I and 110 deg. C. (200 deg. F.) higher in Test II, measured at the kiln charging end, so that steam pressure and steam production was increased; and the water content of the slurry was decreased from 36.5% to 19.1% in Test I and from 36.6% to 18.3% in Test II, so that the slurry filters effected a water removal of 59.0% in Test I and of 61.2% in Test II. The calorific value of the coal varied from 6980 to 7110 kcal. per kg. (12,564 to 12,798 B. t. u. per lb.). The four test periods lasted 11, 20, 24 and 24 hours, respectively. Some American test data are given as a comparison.—*Zement* (1930) **19**, 33, pp. 768-775.

Efficiency of Air Separators. Rosin and Rammler dealt some time ago (*Zement*, 1929, Nos. 26 and 32) with the theory of efficiency of air separation and established three formulas for use in determining the efficiency of air separators. At this time H. Madel presents a constructive criticism of this work and adapts the formulas which are being used by the German technical committee on ore preparation, for use in determining the efficiency of air separators, in order to improve or supplement the work of Rosin and Rammler. He proves the formulas by use of plane diagrams. This criticism is favorably received in an appended discussion by Rosin and Rammler.—*Zement* (1930), **19**, 41, pp. 958-963.

Recent Process Patents

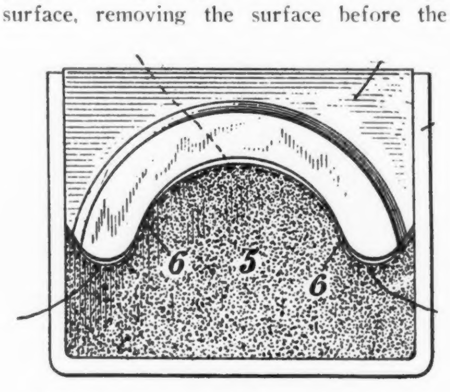
The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Silica for Mineral Filler. A silica mineral filler for a plastic composition that is useful particularly for insulating electrical conductors, where it is desirable that the filler employed have a low inductive capacity, is described. A mineral filler such as silica which has been fused and then ground to the desired fineness has been found to be particularly suitable for this work, according to the patent claims.

In accordance with the invention, the filler is first ground and then heated to a temperature of approximately 950 deg. C., at which temperature it attains full redness. It is maintained at this temperature for several hours and is then allowed to cool in air without taking any precautions to control the kind or quantity of gas absorbed. The filler is then compounded with rubber and vulcanized in the usual manner. *Archie R. Kemp*, assignor to Western Electric Co. *U. S. Patent No.* 1,753,746.

Waterproofing Concrete. The patentee describes a method of waterproofing concrete paving consisting of mixing liquid coal tar with 2 to 5% insulating material, such as asbestos. He proposes to mix approximately 8 to 15 quarts of this preparation to each cubic yard of concrete and intimately mix therewith. *Richard Schubert. U. S. Patent No.* 1,760,214.

Expansion of Cement and Plaster. The patentee describes a method of indicating the expansion or contraction of plaster of paris, portland cement, etc., which comprises molding it against a curved molding surface, removing the surface before the substance has set, allowing it to set and change its dimensions, and then noting the degree of change in comparison with the original molding surface. *John D. Wiggin*, assignor to H. B. Wiggin Sons Co. *U. S. Patent No.* 1,746,691.



Device for measuring expansion of plaster, portland cement, etc.

Alumina Cement from Phosphorus Slag. The author describes a method of preparing phosphorus and a slag from bauxite that is high in iron. The slag is, essentially, an alumina cement. The phosphorus distills off in almost a quantitative yield. Ferruginous bauxite is first fused in an electric furnace with CaO under reducing conditions forming a calcium aluminate free from iron and low in silica. The cal-

cium aluminate is then mixed with calcium phosphate and carbon and treated in a phosphorus furnace. The phosphorus distills off, leaving a slag which when ground is suitable for use as an aluminous cement. *Robert Suchy,* assignor to I. G. Farben-Industrie Aktiengesellschaft. *U. S. Patent No.* 1,758,241.

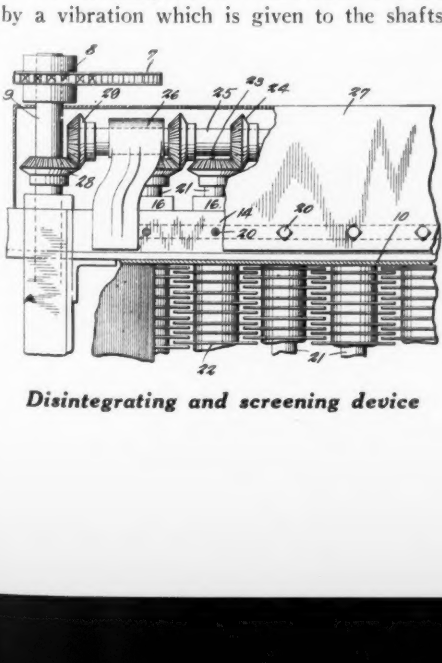
Greensand as a Water Softener. The object of this invention is to treat the greensand or glauconite in such a manner as to make of it an efficient water-softening agent for removing calcium and magnesium from water. Glauconite is a hydrous silicate of iron and potash, and mixed with marl, ordinary sand, and other foreign substances, makes up what is known as greensand. The process produces an improved water-softening material which consists in producing a gel material from a mixture of sodium silicate with a soluble metal salt, agitating this mixture, adding greensand or glauconite while the mixture is being agitated, and at the time gelation has begun to take place, and after complete gelation drying the resulting product. *Frederick K. Lindsay,* assignor to Arizona Minerals Co. *U. S. Patent No.* 1,750,847.

Hydraulic Binding Medium Impervious to Sea and Hard Water. The product is prepared from 80 to 50 parts of aluminous cement produced by fusion, clinkering, or fritting, and 20 to 50 parts of gypsum (raw or calcined at or above 200 deg.) or of anhydrite; alternatively, a crushed mixture of calcium sulphate with the constituents of aluminous cement is calcined. *British Patent No.* 317,783.

Disintegrating and Screening Method. The device shown appears from the outside like a live roll grizzly, but the action is quite different. The shafts carry thin overlapping disks and they all run in the same direction. Usually this is opposite to the movement of the material to be screened down the slope, although the inventor says the reverse motion is better in some cases.

The effect of the overlapping disks is to break up lumps of sand and then to screen out the grains. Large hard lumps and foreign matter are carried on. The device is intended particularly for recovering sand that has been used for making molds in foundries.

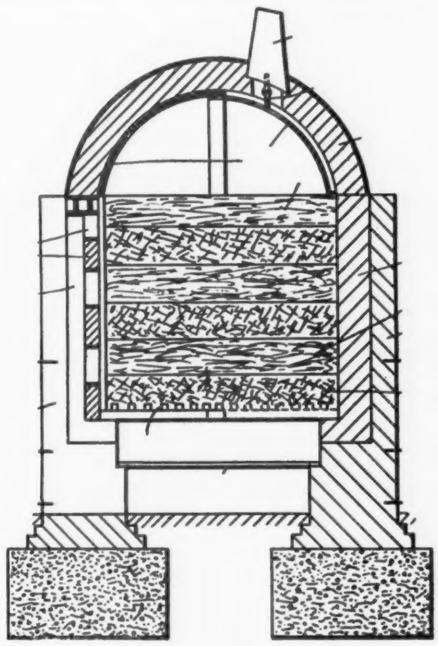
The screening effect of the disks is aided by a vibration which is given to the shafts



Disintegrating and screening device

and disks. The box in which they are placed is swung from the drive shaft at the top and hung on a resilient mounting at the lower end. Several other details are mentioned in the patent specification such as means for cleaning the disks.—*E. S. Royer, U. S. Patent No.* 1,755,364.

White Keene's Cement Manufacture. Heating gypsum to a high temperature causes an oxidation of any iron present and consequently produces an unsatisfactory material as far as color is concerned. The author of the patent proposes to manufacture a plaster from gypsum in one heating operation by stacking lump gypsum, or gypsum in briquet form, together with coal in a closed kiln and in about the proportion by weight of one part of coal to eight parts of gypsum, subjecting the gypsum to slow calcination by burning the coal so that in the process of calcination the products of combustion are caused to permeate the

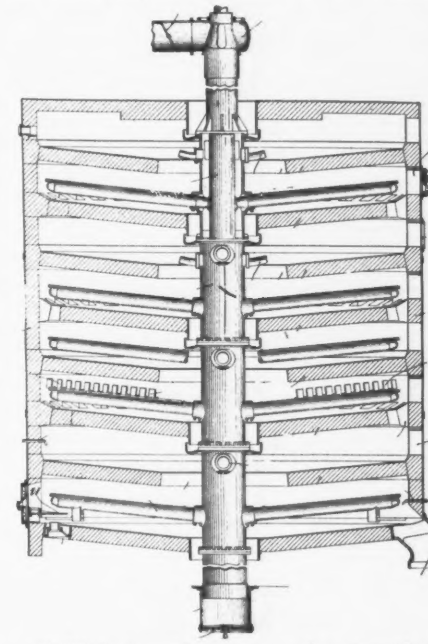


A mixed feed kiln for burning gypsum at high temperatures

gypsum and thoroughly act thereon for such a period of time as will bring the gypsum to a stage when efflorescence begins to appear, and then cooling the calcined mass. *Francis Mulligan. U. S. Patent No.* 1,766,448.

Coloring Slate Granules. The inventor describes in his four different patents methods of coloring slate granules. In one patent he immerses the granules in a bath of sodium silicate of an alkalinity factor of 0.30, which is then boiled to dryness. He then treates the granules in a kiln or oven at 700 deg. F. to 1700 deg. F. A pigment may be suspended in the sodium silicate if desired. He also describes, in three other patents, methods of coloring granules consisting in essence of fusing water soluble silicates or other glass-forming minerals to the granules, so as to form a glaze. The patents describe his processes in detail. *Harry C. Fisher,* assignor to the Philip Carey Manufacturing Co. *U. S. Patent Nos.* 1,766,891, 1,766,814, 1,766,815 and 1,766,892.

Process of Treating Fuller's Earth. The inventor proposes to use a multiple-hearth furnace similar to that shown in the accompanying drawing for the treating



Multiple-hearth furnace for treating Fuller's earth

of Fuller's earth. The continuous process of revivifying spent Fuller's earth charged with the residue from oil filtration, comprises oxidizing such residue by continuously passing the material through a multiple-hearth furnace with sufficient rabbling action to maintain the material in loose, finely divided condition, supplying sufficient air to the material in the furnace and initially heating it with heat of this oxidizing process, and utilizing substantially solely the heat of combustion of the residue to supply the heat necessary to completely oxidize the residue and to maintain the process. *Henry J. Hartley,* assignor to Nichols Copper Co. *U. S. Patent No.* 1,768,465.

Building Material. The patentee describes a building material that he proposes to use for walls, floors, roofs and for general insulation. The material consists of zonolite, 30% by volume; ground cinders or ground burnt clay, 50% by volume, and asphalt, 20% by volume. Zonolite is a natural product found in large quantities in northwestern Montana. This material as mined resembles slate or slag such as found in anthracite coal and has a greenish, flaky appearance. The zonolite is treated with heat at approximately 2500 deg. F., this intense heat serving to change the characteristics of the material so that it is increased in volume approximately 15 times and forms a yellow or gold appearing flaky substance which is extremely light and has some of the characteristics of mica and some of the characteristics of asbestos, but is not the same as either. *Henry F. Winkelman. U. S. Patent No.* 1,743,744.

New Crushed-Stone Operation in Northern New York Grows Fast

THE BORRMAN STONE PRODUCTS, INC., Norwood, N. Y., is installing a new crushing plant which will give an output of 1800 tons of finished product per day and it was expected to be in operation by December 1. Recently the Borrman Co. began the work of grading preparatory to building a siding from the Norwood and St. Lawrence railroad to their plant to take care of its rail shipments. The new corporation will also handle cement and other material used in road building.

In 1928 William F. Borrman and Francis L. Borrman started a small stone crushing plant on the William F. Borrman farm about two miles north of this village with a daily capacity of about 200 tons of finished product. When their product was put on the market and tested out it was found to be of an exceptionally high quality and the demand increased rapidly. Improvements were made to take care of the demand and during this year the plant has been run night and day to fill orders and plans were made to increase the output to 1000 tons per day.

In August William F. and Francis L. Borrman took into partnership Oliver Spellman of Chateaugay, N. Y., and the new company was incorporated as the Borrman Stone Products, Inc.—*Watertown* (N. Y.) *Times.*

Ohio Quarry Gives Stone Free to Aid City Unemployment

WORK on the East Battery improvement project, Sandusky, Ohio, as a city unemployment relief measure was expected to begin December 1, when about 50 men were to be put to work in the Milan Rd. quarry to prepare stone for the improvement, J. M. Eakin, city engineer, said recently.

He said that efforts are being made by the city to locate timber tracts from which timber may be taken and men put to work on that also.

Mr. Eakin said he was working on plans for the basin which would be submitted to U. S. Government offices at Buffalo for approval.

The stone for the "fill" will be provided by the Wagner Quarries Co. free of charge, providing the city does the quarrying work and hauling.

Registration for men to be employed is to be taken from lists of A. R. Williams of the state-city employment bureau. Mr. Williams said Tuesday that his bureau was willing to co-operate to the utmost with the city in seeking to relieve unemployment. He said that the work at East Battery did not solve the city's unemployment problem by any means and that his bureau would continue to function in supplying odd jobs and part time work for men who are not employed.—*Sandusky* (Ohio) *Register.*

Iowa Aggregate Producers Against Wage Cuts

THE Iowa Aggregate Producers Association, composed of crushed stone, sand and gravel producers of the state, in session at Hotel Fort Des Moines November 20, adopted a resolution indorsing President Hoover's appeal to employers to maintain a wage scale in 1931 equal to that of 1930.

The resolution was transmitted to the president, Gov. John Hammill, Governor-elect Dan Turner and members of the next Iowa general assembly, and points out the belief of the aggregate producers that "only by maintaining a living wage to labor can we expect an early return to normal conditions."

R. C. Fletcher, executive of three sand and gravel concerns here and former president of the National Sand and Gravel Association, pointed out that the aggregate producers of Iowa employ a large amount of labor and that their combined pay roll runs into several hundred thousand dollars annually. He said they have steadily maintained their wage scale in spite of the fact that volunteer laborers were willing to work for a much lower figure.

E. W. Gray of Des Moines, president of the Iowa Aggregate Producers Association, and S. P. Moore of Cedar Rapids, secretary and treasurer, emphasized that the organization is not asking other employers to do something which the association is not already practicing among its own ranks.

The complete text of the resolution is:

"We, the producers of crushed stone, gravel and sand, represented by the Iowa Aggregate Producers Association, as employers of a large amount of labor, indorse the general policy of President Hoover in his appeal to employers to maintain a wage scale in 1931 equally as good as 1930.

"We commend other employers who indorse this same policy, as we sincerely believe that only by maintaining a living wage to labor can we expect an early return to normal conditions."—*Des Moines* (Ia.) *Tribune Capital.*

Crushed-Stone Plants Versus Creamery—Creamery Moves

THE ACTION brought by Robert A. Stewart, proprietor of a creamery at Hagersville, Ont., against the Dufferin Paving and Crushed Stone Co., Ltd., and Hagersville Quarries, Ltd., claiming damages of $50,000 to the plant and business due to quarrying operations, was settled after a visit of the principals to the scene.

The settlement requires that a consideration of $5000 be paid to the creamery company for the lands and premises exclusive of machinery and equipment together with fixed costs of the action of $300 and that the creamery company move to other quarters.—*Hamilton* (Ont.) *Herald.*

Indiana Crushed Stone Producers Co-operate to Prevent Unemployment

SPECIAL ARRANGEMENTS to maintain a pay roll during the next four months have been made by fifteen Indiana crushed stone companies, Dr. John H. Hewitt, secretary of Governor Harry G. Leslie's unemployment council, announced recently.

Customarily the crushed-stone plants close during December, January, February and March, Dr. Hewitt said.

The three months' pay roll will total approximately $300,000.

Decision of the companies thus to cooperate with the unemployment council was reached at a recent conference and given Dr. Hewitt by Dana Ward, of Indianapolis, secretary of the Indiana Crushed Stone Association.

County relief organizations now are functioning in 80 counties, Dr. Hewitt said. Surveys of unemployment and economic conditions in the various counties are under way and reports will be submitted to the central office in the Statehouse soon.

A comprehensive check to determine all uncompleted projects such as buildings and repairs likewise is under way. Several such projects have been located. Owners of buildings where uncompleted projects are found will be urged to complete the work at once.—*Indianapolis* (Ind.) *Star.*

More Idaho Phosphate to Be Developed for Making Fertilizer

TWO TRACTS of phosphate land in Bear Lake and Caribou counties of Idaho are held by the Anaconda Copper Co. and L. G. Liebmann, promoter. Applications are on file by private individuals for about three square miles more of the deposit, the state land department at Boise announced, when advised of the reported plans for the Consolidated Mining and Smelting Co. of Canada, to use some of the deposits in fertilizer manufacture.

The British Columbia Co. has not applied to lease or purchase any of the deposit from the state in its own name.

The Liebmann lease was approved two years ago at the same time he filed on about 12,000 second feet of water in the Salmon and lower Snake rivers for power purposes.

The Anaconda Copper Co. holding is worked extensively during periods of high prices for fertilizer, but only a small force is kept there in times of little demand. The company ships the product to Anaconda for manufacture.

Bear Lake county is in the corner of Idaho, joining Utah and Wyoming. Caribou is the next county north, also joining Wyoming.—*Spokane* (Wash.) *Chronicle.*

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

	Limestone Flux Week ended		Sand, Stone and Gravel Week ended	
District	Nov. 1	Nov. 8	Nov. 1	Nov. 8
Eastern	2,037	1,921	9,733	8,319
Allegheny	1,962	1,805	6,380	4.546
Pocahontas	340	236	1,243	1,243
Southern	653	430	9,015	8,860
Northwestern	1,316	1,367	5,651	5,060
Central Western	646	561	8,607	8,639
Southwestern	452	469	6,028	6,339
Total	7,406	6,789	46,657	43,006

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1929 AND 1930

	Limestone Flux		Sand, Stone and Gravel	
	1929	1930	1929	1930
	Period to date		Period to date	
District	Nov. 9	Nov. 8	Nov. 9	Nov. 8
Eastern	150,908	127,896	519,540	372,947
Allegheny	161,653	120,658	334,441	285,128
Pocahontas	17,123	20,449	45,321	57,159
Southern	27,079	28,118	399,695	368,780
Northwestern	51,050	44,400	288,275	246,977
Central Western	23,676	21,747	480,620	438,497
Southwestern	22,498	20,133	312,829	289,186
Total	453,987	383,401	2,380,721	2,058,674

COMPARATIVE TOTAL LOADINGS, 1929 AND 1930

	1929	***1930***
Limestone flux	***453,987***	***383,401***
Sand, stone, gravel	***2,380,721***	***2,058,674***

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week of November 29:

SOUTHERN FREIGHT ASSOCIATION DOCKET

52802. **Silica,** from points in Illinois to points in Tennessee. Present rates, class rates. Proposed rates on silica (silex), in packages or in bulk, carload minimum weight 50,000 lb., from Elco, Gravel Pit, Mill Creek and Tamms, Ill., to Chattanooga, 29c; Cleveland, 30c; Lenoir City, 32c, and Nashville, Tenn., 23c per 100 lb. The proposed rates are the same as 11th class rates.

52803. **Crushed stone,** from Hitchcock Mill, Va., to Southern Ry. Norfolk division stations. It is proposed to revise rates on crushed stone, carload (See Note 3), from Hitchcock Mill, Va., to Southern Ry. Norfolk division stations, Nelson to Capron, inclusive, on basis of I. C. C. Docket 17517 joint line scale. Statement of the present and proposed rates will be furnished upon request.

52832. **Limestone, ground,** from Cartersville, Ga., and Sparta, Tenn., to Little Rock, Ark. It is proposed to establish through rates on limestone, ground, carloads, from Cartersville, Ga., and Sparta, Tenn., to Little Rock, Ark., of 360c and 273c per ton of 2000 lb., respectively, in lieu of present through rates, viz., 394c and 307c per net ton, respectively. The proposed rates are made on basis of Memphis, Tenn., combination.

52834. **Lime,** from Milltown and Marengo, Ind., to points in the Mississippi Valley and intermediate Kentucky points. It is proposed to cancel current rates on lime, carload, from Milltown and Marengo, Ind., to points in the Mississippi Valley and to points in Kentucky intermediate to the Valley via the direct lines and revise them on a relative basis with those in effect from Louisville, Ky., and Evansville, Ind. Statement of proposed rates to representative points will be furnished upon request.

52835. **Lime,** from Milltown and Marengo, Ind., to points in the Southeastern and Carolina territories. It is proposed to cancel arbitrary of 3½c per 100 lb. authorized over New Albany, Ind., in constructing rates on lime, carloads, from Milltown and Marengo, Ind., to points in the Southeast and Carolinas published in Rate Bases 200 and 201 of Agent Speiden's origin Basis Book 39-K, I. C. C. 1296, and Rate Bases 225, Agent Speiden's Carolina Tariff 45-G, I. C. C. 1358, and publish a specific rate of 70c per net ton on lime, carloads, from Milltown and Marengo, Ind., to New Albany, Ind., to be used in constructing rates to points in the Southeast and Carolinas, using beyond New Albany, Ind., the rates published in Agent Speiden's Lime Tariff 186-A, I. C. C. 1250.

52860. **Sand, gravel, crushed stone, etc.,** from Glenita and Harpers Siding, Va., to L. & N. Cumberland Valley division stations in Virginia. In lieu of combination rate it is proposed to establish rates on sand, gravel, crushed stone (except bituminous rock or bituminous asphalt rock), slag, rubble stone, broken stone and chert, in straight or mixed carloads (See Note 3), from Glenita and Harpers Siding, Va., to L. & N. Cumberland Valley division stations in Virginia—on basis of I.C.C. Docket 17517 Joint Line Scale. Statement of proposed rates will be furnished upon request.

52883. **Lime (calcium), acetate of,** from Lyle, Tenn., to Norfolk, Va., and Philadelphia, Penn. Present rates, to Norfolk, Va., 49c; Philadelphia, 65½c per 100 lb. Proposed commodity rate on lime (calcium), acetate of, dry, in bags or barrels, carloads, minimum weight 50,000 lb., from Lyle, Tenn., to Norfolk, Va., and Philadelphia (docks), Penn., the rate to Philadelphia, Penn., applying via rail and water routes via Norfolk, Va., 47c per 100 lb. Same as in effect via Charleston, S. C.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

52900. **Stone, crushed or rubble,** from Boxley, Va., to N. & W. Ry. stations between Norfolk and Petersburg, Va. At present, combination rates apply. It is proposed to establish, for intrastate application, rates on crushed stone, carloads (See Note 3), from Boxley, Va., to stations on the N. & W. Ry. between Norfolk and Petersburg, Va., viz.: 150c to South Norfolk; 140c to Gilmerton, Yadkin and Brico; 130c to Ligon, Dwight and Dane; 120c to Logman, J. W. Rogers, 57-Mile Siding, Vaport, Dillion (Henry Cy) and Fargo, and 110c per net ton to Disputanta, Hobbs, Saunders and New Bohemia, Va.

52906. **Limestone and marble or marl,** from Jefferson City, Tenn., to Southern points. It is proposed to add Jefferson City, Tenn., as an origin to Southern Railway Tariff, I. C. C. A10166, which contains scale rates applicable on limestone from various producing points to Southern Freight Association territory.

52913. **Crushed marble or marble chips,** from Mobile, Ala. (import traffic), to Jackson, Miss., Meridian, Miss., and Montgomery, Ala. It is proposed to establish rates on crushed marble or marble chips, carloads, from Mobile, Ala. (import applicable from shipside), to Jackson, Miss., Meridian, Miss., and Montgomery, Ala., on basis of 115% of the I. C. C. 17517 scale—made in line with rates proposed under Submittal 52332, from New Orleans, La.

52966. **Stone, marble, calcite, limestone, slate or whitestone,** from Whitestone, Tate, Ga., Brownson, Gantt's Quarry, Ala., Mineral Bluff, Ga., Kinsey, N. C., Fairmount, Bolivar, Ga., Tellico Plains, Louisville, Marmor, Pinkmar, Kingsley, Pickford and Knoxville, Tenn., to Chardon, Ohio. At present, combination rates apply. It is proposed to establish rates on stone, marble, calcite, limestone, slate or whitestone, carloads, from and to the above named points the same as currently in effect from the origins involved to Ashtabula, Ohio. Statement of the present and proposed rates and minimum weight will be furnished to those interested upon request.

SOUTHWESTERN FREIGHT BUREAU DOCKET

21497. **Lime,** from Mercer, Ark., to Kansas and Oklahoma points. To establish the following rates in cents per 100 lb. on lime, carloads, minimum weight 30,000 lb., from Mercer, Ark., to points shown below:

To	Rate
K. O. & G.	
Sokog, Kan.	15½
Genako, Okla.	15½
Mile 19, Okla.	15½
Miles, Okla.	15½
Quapaw, Okla.	15½
Miami, Okla.	15½
Traber, Okla.	17
Fairland, Okla.	17
Clarita, Okla.	29
Bromide Jct., Okla.	29
Galbreath, Okla.	29
Bromide, Okla.	29
Wapanucka, Okla.	29
Coleman, Okla.	29
Kenefick, Okla.	29
Ury, Okla.	29
Durant, Okla.	29
Henryetta, Okla.	26½
St. L.-S. F.	
Miami, Okla.	15½
Quapaw, Okla.	15½
Ontario, Okla.	15½
Goodeagle, Kan.-Okla.	15½
Muskogee, Okla.	22½
Durant, Okla.	29

The rates on lime from Mercer, Ark., to Oklahoma and Kansas are, generally speaking, based 1½ cents per 100 lb. over the rate from Ash Grove, Mo., and is the basis proposed. The establishment of rates to Muskogee and Durant on the St. L.-S. F. Ry. is for the purpose of meeting the competition of the M.-K.-T. R. R.

21525. **Chatts, crushed stone, etc.,** from points in Missouri to stations on K. C. S. Ry. To establish the following rates in dollars and cents per ton of 2000 lb. on chatts, crushed stone, sand, cinders, carloads, minimum weight 60,000 lb., except where car is loaded to full visible or space carrying capacity, in which case actual weight will govern, from origins on K. C. S. Ry. and J. & P. Ry. Joplin district, as shown in Group 2, K. C. S. Tariff 412E to K. C. S. Ry. stations shown below:

To	Rate
West Line, Mo.	$1.10
Drexel, Mo.	1.05
Merwin, Mo.	1.00
Amsterdam, Mo.	1.00
Amoret, Mo.	.95
Hume, Mo.	.90
Amos, Mo.	.90
Stotesbury, Mo.	.85
Richards, Mo.	.85
Eve, Mo.	.80
Reo, Mo.	.80
Swart, Mo.	.80
Hand, Mo.	.80
Oskaloosa, Mo.	.75
Mulberry, Mo.-Kan.	.70

The scale proposed, it is stated, is the Missouri State single line scale as applied from cross country origins on Missouri Pacific for like distances, and it is desired to publish the state scale for interstate application through Kansas. Intermediate destination in Kansas will not be affected account carrying a lower rate than is proposed to destinations in Missouri.

21529. **Cement,** from points in the Southeast to Missouri and Kansas. To establish the I. C. C. Docket 8182 Scale 3 rates to Missouri (south of Missouri river) and eastern Kansas and Scale 4 rates to western Kansas on cement, hydraulic, natural or portland, straight or mixed carloads, minimum weight 50,000 lb., except that when marked capacity of car is less, actual weight but not less than 40,000 lb. will apply, from Chattanooga, Tenn., Clinchfield, Ga., Cowan, Tenn., Knoxville, Tenn., Kosmosdale, Ky., Leeds, Ala., Nashville, Tenn., Portland, Ga., Ragland, Ala., Richard City, Tenn., and Rockmart, Ga. Under Southern Freight Association Proposal 10364 through rate on a mileage scale basis was proposed from Spocari, Birmingham, North Birmingham, Boyles and Phoenixville, Ala., to points in Missouri (south of the Missouri river) and Kansas. Same explained that at present time through rates are published to Arkansas under I. C. C. Docket 16845, which is I. C. C. Docket 8182, Scale 3, and that authority has been extended to publish through rates to Oklahoma and Texas, Scale 3, to eastern half of the state of Oklahoma and at points west, Scale 4. In the handling thereof, evidently through oversight, no record was

made relative to amending same in order that through rates might be provided on basis of the same scale from all southern cement producing points desiring rates.

21542. **Stone**, from Missouri points to Kellogg, Ill. (destined beyond). It is proposed to cancel present rates on stone, broken or crushed, carloads (See Note 1), but not less than 60,000 lb., from Marbleton, Rush Tower and St. Marys, Mo., to Kellogg, Ill. (applicable on shipments destined beyond), and allow the combination rates to apply. Present rates were published for the purpose of equalizing the East St. Louis, Ill., combination via Kellogg, Ill. At the time they were first published that purpose was accomplished; however, since then the rates from Kellogg have been reduced and, as a result thereof, the Kellogg combination produces lower charges than the East St. Louis, Ill., combination. By reason of this, shipments are naturally moving via Kellogg, Ill., instead of East St. Louis, Ill., thereby depriving proponent line of its long haul to East St. Louis, Ill.

21544. **Lime**, from Missouri and Arkansas points to Drumright, Okla. To establish a rate of 26c per 100 lb. on lime, carloads, minimum weight 30,000 lb., from Ash Grove, Mo., Galloway, Mo., Osceola, Mo., Pierce City, Mo., Sequiota, Mo., Springfield, Mo., Johnsons, Ark., to Drumright, Okla. There are oil refineries at Drumright, using lime, and in competition with refineries at Cushing, Oklahoma City and other points in this immediate territory. The joint line rate via Frisco and Santa Fe to Cushing is 26c, as is also the single line rate via Frisco to Oklahoma City. Distance and competition considered, shippers state that the maximum rate from Group 1 points to Drumright should not exceed the Cushing or Oklahoma City rate of 26c.

21545. **Slate**, from Mena, Ark., to Chicago, Ill. To establish a rate of $4.30 per ton of 2000 lb. on **slate, crushed or ground**, carloads, minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb., marked capacity of car will govern, from Mena, Ark., to Chicago, Ill. The commodity involved, it is stated, is nothing more or less than crushed and ground stone and is to be used as an abrasive in the manufacture of composite roofing. This will be new traffic in this section and will afford a nice movement and will also assist the Southwestern lines in developing additional tonnage which has heretofore moved generally from eastern origins.

21559. **Gypsum rock** from Winnfield, La., to Dallas, Tex. To establish a rate of 14½c per 100 lb. on gypsum rock, carloads (See Note 2), from Winnfield, La., to Dallas, Tex. It is stated that a large deposit of gypsum rock has recently been discovered in the vicinity of Winnfield, La., and a crushing plant at that point expects to begin shipping the rock in the near future, provided rate is established on which this low-grade traffic can move.

21578. **Plasterboard, etc.**, from Texas and Oklahoma points to Kansas points. To establish the following rates in cents per 100 lb. on plasterboard, plaster wallboard, etc., as described in Item 11, S. W. L. Tariff 3-I, carloads, minimum weight 50,000 lb., from Texas points named in S. W. L. Tariff 3-I, and Oklahoma points named in St.-L.-S. F. Ry. Tariff 381H, to points in Kansas on the Union Pacific R. R., as follows:

To	*Texas points	†Oklahoma points
Ellis	45½	32½
Ellsworth	39	27
Glasco	36	25
Gorham	45½	32½
Hays	45½	32½
Minneapolis	36	24½
Natoma	47	34
Russell	45½	31½
Simpson	36	25
Sylvan	46½	31½
Victoria	45½	32½
Wakeeney	44½	31
Wilson	46½	34

*Also Eldorado, Okla. †Except Eldorado, Okla.

The points of destination involved, it is stated, are located within the territory to which the Interstate Commerce Commissoin prescribed rates on plasterboard and plaster wallboard with relation to the rates on fiber board from Rockport, N. Y., in their order in Docket 17006. At the time rates were checked in in compliance with this order no rates were authorized to these points, account apparent lack of movement. However, shipper advises that there are shipments of plasterboard to these destinations and have requested that rates be established in accordance with the formula prescribed by the commission in their order.

21595. **Gravel, etc.**, between Oklahoma points and Kiddo, Mo. To amend Item 6998F, S. W. L. Tariff 44-O, applying on **gravel, crushed stone and sand**, carloads, description and minimum weight as per that item, applying between Oklahoma points and points in Kansas and Missouri, by adding Kiddo, Mo., as a point of destination in Note 1 thereof. It is stated that the proposed basis is the same as that applicable from and to Neosho, Mo., two miles less distant than Kiddo, Mo., and shippers desire this basis in view of the present rates, which are thought to be prohibitive.

CENTRAL FREIGHT ASSOCIATION DOCKET

26732. To establish on **sand and gravel**, carloads (See Note 3), from Milford, Ind., to points in Indiana, rates as shown in Exhibit A attached. Present rates as shown in Exhibit A attached.

EXHIBIT A

To Indiana points on P. R.R., in cents per net ton

	Pres.	Prop.		Pres.	Prop.
Ft. Wayne	98	90	Plymouth	92	80
Hadley	98	85	Donaldson	100	85
Arcola	98	85	Grovertown	100	85
Coesee	98	80	Hamlet	100	90
Columbia City	98	80	Davis	100	90
Larwell	98	80	Bee Grove	100	90
Pierceton	92	80	Hanna	100	95
Winona Lake	92	80	Wanatah	100	95
Atwood	87	80	Montdale	112	100
Etna Green	87	80	Valparaiso	112	100
Bourbon	87	80	Wheeler	126	105
Inwood	92	80	Hobart	126	105

26741. To establish on **sand and gravel**, carloads (See Note 3), from Indianapolis, Ind., to Pendleton, Ind., rate of 70c per net ton. Present rate, 65c per net ton.

26753. To establish on **sand and gravel**, carloads (See Note 3), from Troy, O., to Fostoria, O., rate of $1.05 per net ton. Route: B. & O. R. R., Lima, O., and N. Y. C. & St. L. R. R. Present rate, $1.15 per net ton via B. & O. R. R. direct.

26758. To establish on **sand** (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and** gravel, carloads (See Note 3), from Akron, O., to Farrell, Sharon and Sharpsville, Penn., rate of 90c per ton of 2000 lb. Present rate, $1.15 per ton of 2000 lb.

26776. To establish on **waste stone**, in open-top cars, carloads (See Note 3), from Elwood Junction, Penn., to Wirton, W. Va., rate of 80c per ton of 2000 lb. Present rate, 12½c (sixth class).

26778. To establish on **sand and gravel**, carloads, in open-top equipment (See Note 3), from Steubenville, O., to W. & L. E. Ry. points in Ohio, rates as shown below. Present and proposed rates (in cents per ton of 2000 lb.):

To W. & L. E. Ry. points in Ohio:

	Prop.	Pres.		Prop.	Pres.
Oneida	100	(1)	St. Clairsville	100	(1)
Connotton	80	(1)	Neffs	100	(1)
Jewett	85	(1)	Herrick	90	(1)
Pittsburgh Jct.	85	(1)	Dun Glen	95	(1)
East Cadiz	85	(1)	Dillonvale	95	(1)
Unionvale	90	(1)	Glen Run	95	(1)
Adena	90	(1)	Connor	95	(1)
Maynard	95	(1)	Warrenton	95	(1)

(1) Combination rates; no through rates in effect.

26779. To establish on **firestone**, carloads, minimum weight 60,000 lb., from New Castle, Penn., to Trafford, Penn., rate of 180c per ton of 2000 lb. Present rate, 16½c (sixth class).

26780. To establish on **firestone**, carloads, minimum weight 60,000 lb., from New Castle, Penn., to Grove City, Penn., rate of 135c per ton of 2000 lb. Route—Shenango, Penn., and B. & L. E. R. R. Present rate, 12c (sixth class).

26787. To establish on **limestone, agricultural** (not ground or pulverized), in bulk, in open-top cars; **stone, crushed,** in bulk, in open-top cars, and **stone screenings** (See Note 3), from Bluffton, Ind., to C. C. C. & St. L. Ry. destinations in Illinois, rates as shown below. Present and proposed rates to points in Illinois:

	Pres.	Prop.		Pres.	Prop.
Chrisman	*	130	Carmi	*	155
Marshall	*	135	Kansas	*	140
Robinson	*	140	Mattoon	*	140
Lawrenceville	*	145	Shelbyville	*	145
Mt. Carmel	*	150	Pana	*	145
Grayville	*	155			

*Class rates.

26791. To establish on **molding sand**, carloads (See Note 3), from Bremen and New Lexington, O., to Elmira, Ont., rate of 474c per ton of 2000 lb. Route—Via P. R. R., Detroit, Mich., and connections, or via P. R. R., Ashtabula, O., and Port Burwell, Ont., and connections. Present rates, 29½c from Bremen and 30c from New Lexington, O.(sixth class).

26808. To establish on **lime, common, hydrated, quick or slaked** (except agricultural or fluxing lime having no commercial value for chemical or building purposes), minimum weight 30,000 lb., from Gibsonburg, Woodville, O., to Green Bay, Wis., rate of 23c (to be applicable only via Menominee, Mich.). Represents Menominee combination of 15½c Gibsonburg and Woodville to Menominee, and 7½c Menominee to Green Bay. Present rate, 29½c (sixth class).

26829. To establish on **blocks, building** (solid, hollow or perforated), made of cement or concrete cinder (not ornamental or decorative nor reinforced with metal), except enameled, individual blocks not being packed, carload minimum weight 60,000 lb., from Allegheny, Penn. (Pittsburgh, North Side), to Grove City, Penn., rate of $1.50 per ton of 2000 lb. Route—B. & O. R. R., Butler, Penn., B. & L. E. R. R. Present rate, sixth class, of 14c.

26830. To establish on **fluxing stone**, carloads (See Note 3), from the Bedford-Bloomington, Ind., district to Portsmouth, O., rate of $1.76 per gross ton. (Rate to apply on shipments loaded in open-top cars except during period of general car shortage, when open-top equipment is not available and closed equipment is furnished at carriers' option.) Present rate, $1.90 per net ton.

26809. To establish on **blocks, building** (solid, hollow or perforated), made of cement or concrete, not reinforced with metal, except enameled, individual blocks not being packed, carloads, minimum weight 60,000 lb., from Erie, Penn.:

To		Pres.	*Prop.
Youngsville, Penn.	(a)	150*	135
Big Bend, Penn.	(b)	180*	165
Bradford, Penn.	(d)	15½	210
Ludlow, Penn.	(c)	195*	180
Emporium, Penn.	(d)	17½	240
Sizerville, Penn.	(d)	17½	255
Turtle Point, Penn.	(d)	18½	240
Portville, N. Y.	(d)	17½	225
Hinsdale, N. Y.	(d)	17½	225
Machias, N. Y.	(d)	18½	240
Chaffee, N. Y.	(d)	15	255
East Aurora, N. Y.	(d)	15	240
Buffalo, N. Y.	(d)	15	165

*Rates in cents per ton of 2000 lb.
(a) Intermediate to Warren, Penn.
(b) Intermediate to Salamanca, N. Y.
(c) Intermediate to Kane, Penn.
(d) Sixth class, in cents per 100 lb.

Sup. 1 to W. D. A. 25990—Correction Notice—White Docket Advice 25990, Docket Bulletin 1833, dated August 21, 1930, with reference to establishing on **crushed stone**, carloads, from Monon, Ind., to Dunkirk, Ind., rate of $1.10 per net ton, changed docket number to read 16050 instead of 15893.

26814. To establish on **crushed stone**, carloads (See Note 3), from Spore, O. (a) To White Cottage, Elizabeth, Lewis, Muskingum, South Zanesville and Zanesville, O., rate of 90c; present rate, 105c. (b) To (1) Stovertown and Camelville, O., rate of 90c; present rate, 120c.

(c) To		Pres.	Prop.
Cannon, O.		100	80
Saltillo, O.		100	80
Crooksville, O.		100	80
Tropic, O.		110	90
Misco, O.		110	90
Sayre, O.		110	90
Tatmans, O.	(1)	110	90
(d) To		**Pres.**	**Prop.**
Congo, O.		110	90
Drakes, O.		110	90
Buckingham, O.		110	90
Hemlock, O.		110	90
Carrington, O.		110	90
Shawnee, O.		110	90
Hartleyville, O.		110	90
Mortonville, O.	(3)	340	90
Hollister, O.	(3)	340	90
Hunterdon, O.	(3)	340	90

(e) To Calvin, O., rate of 110c; present rate, 410c.

(1) Present rate under intermediate clause.
(3) Sixth class rate.

26831. To establish on **sand, glass or molding**, carloads (See Note 3), to Rochester, Mich. In cents per 2000 lb.

From	Prop.	Pres.
Ausanba, Ky.	252	(1) 315
Mentor, Ky.	252	(1) 315
Lawton, Ky.	264	(1) 327

(1) Lapeer, Mich., rate, Rochester, Mich., being intermediate to this point.

26832. To establish on **lime**, carloads, minimum weight 30,000 lb., from Mitchell, Ind., to Madison, Wis., rate of 18c. Present rates, 21½c, minimum weight 30,000 lb., and 19c, minimum weight 40,000 lb.

26833. To establish on **cement, common, hydraulic, natural or portland**, carloads, minimum weight 50,000 lb., to Berrien Springs, Mich.

From	Prop.	*Pres.
Cement City, Mich.	12	19
Coldwater, Mich.	11	17
Quincy, Mich.	11	17

*Sixth class.

TRUNK LINE ASSOCIATION DOCKET

25151. **Crushed or ground slate**, carloads (See Note 2), but not less than 80,000 lb., from Cardiff, Md., Delta, Slate Hill, Penn., and Whiteford, Md., to York, Penn., 7c per 100 lb. Present rate, 10c per 100 lb., minimum carload weight 50,000 lb. Reason—Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

25152. **Slag**, in bulk, carloads (See Note 2), from Easton, Penn., to Delabole, Penn., 90c per net ton. Present rate, $1.05 per net ton. Reason—Proposed rate is comparable with rates from Easton, Penn., to Martins Creek and Bangor, Penn.

25155. **Crushed stone**, carloads (See Note 2), from Worthington, Penn., to Pittsburgh & Shawmut Railroad stations, Smith Summit, 90c; Ramsaytown, 80c; Timblin, 70c; Furnace Run, 60c; Freeport Junction, 70c, and Kittanning, Penn., 60c per net ton. Reason—Proposed rates are based on West Penn Scale, P. S. C. Penn. Docket 6951.

25161. **Roofing granules, slag**, carloads, minimum weight 50,000 lb., from Marietta, Penn., to Duluth, Minn., $7.10, and Minneapolis, Minn., and

St. Paul, Minn., \$6.90 per net ton. Reason—Proposed rates are comparable with rates on stone chips or granules, carloads, from Easton, Nottingham, Penn., etc.

25166. **Plaster, viz.: Blocks, fireproofing plaster; blocks, gypsum; dry mortar; fireproofing plaster; marble dust; plaster, blocks; plaster, calcined (plaster of paris); plaster, land; plaster, stucco; plaster, wall; whiting**—straight or mixed carloads, 40,000 lb.—Group A. **Plaster,** carloads as enumerated above in mixed carloads with lime and plaster board; plaster board, carloads (for mixed carloads with lime and plaster)—40,000 lb.—Group B. **Lime,** carloads (for mixed carloads with plaster and plaster board)—40,000 lb.—Group C. From North Bergen, N. J., to Stone Harbor, Wildwood Gardens, Wildwood-Holly Beach, N. J., rates 19½c Groups A and C, and 21½ cents Group B. (Present rates 17½c Groups A and C, and 19½c Group B). And from Newburgh, N. Y., to Wildwood-Holly Beach, N. J., 22½c Groups A and C, and 24½c Group B. (Present rate 29½c Groups A, B and C). Rates in cents per 100 lb. Reason—To remove Fourth Section violations.

25176. (A) **Crushed stone** and (B) **crushed stone coated with oil, tar, or asphaltum,** carloads (See Note 2), from Bethlehem, Penn.

To	Prop. rates (A)	(B)
York, Penn.	\$2.10	\$2.15
Easton, Md.	2.10	2.15
Milford, N. J.	1.00	1.10
Chestertown, Md.	2.10	2.15
Oxford, Penn.	1.80	1.90
Dover, Del.	1.95	2.05
Elkton, Del.	1.80	1.90
Milville, N. J.	1.80	1.90
Conowingo, Md.	1.95	2.05
Lansdowne, Penn.	1.60	1.70
Aberdeen, Md.	1.80	1.90
Tobyhanna, Penn.	......	1.35

25180. **Crude fluxing limestone,** carloads (See Note 2), from Kittanning, Penn., to Pittsburgh, Penn., 90c per gross ton. (Present rate, 12c per 100 lb., sixth class.) Reason: Rate is comparable with others in the same general territory involving like hauls.

25184. **Broken stone,** carloads (See Note 3), from Devault, Penn., to Plymouth Meeting, Penn., 70c per net ton. (Present rate, 80c per net ton.) Reason: Rate comparable with others involving like hauls.

25191. **Lime, common, hydrated, quick or slaked,** in packages or in bulk, carloads, minimum weight 30,000 lb., from Staunton, Va., to Pembroke, Penn., \$2.70; Swedesboro, Salem, Elmer and Vineland, N. J., \$3.70; Irvington, Newark, Mt. Holly, Merchantville, N. J., Doylestown, Lansdale, Nanticoke, Kingston, Scranton, Wilkes-Barre and Allentown, Penn., \$3.80, and Atlantic City, N. J., \$4.10 per net ton.

24796, Sup. 3. Amend Rate Proposal 24796, covering **plaster, plaster board and lime,** carloads, from Akron, Batavia, Clarence Centre, Transit, Oakfield and Wheatville, N. Y., Philadelphia, Chester-Marcus Hook, Penn., to stations on the N. & W. Ry., by adding New Brighton, N. Y., as a point of origin at same basis as proposed from Akron-Oakfield district.

25101. **Plaster,** carloads for mixed carloads with lime and plaster board, see footnote, viz.:

Dry mortar: fireproofing, plaster, marble dust; plaster blocks; plaster, calcined (plaster of paris); plaster, land; plaster, stucco; plaster, wall; whiting—A.

Plaster board, carloads (for mixed carloads with lime and plaster, see footnote)—**B.**

Lime, carloads (for mixed carloads with plaster board, see footnote)—C. **Minimum weight 40,000 lb.**

Footnote: Mixed carloads of lime, plaster and articles taking same rates, and plaster board, will be charged at actual weight and at the applicable carload rate for each of the respective commodities in straight carloads, subject to minimum weight of 40,000 lb. for each mixed carload; deficit in the minimum weight, if any, to be paid for at the rate on plaster, carloads.

From Batavia, N. Y., Clarence Centre, N. Y., Transit, N. Y., Akron, N. Y., Oakfield, N. Y., Wheatville, N. Y. Rates in cents per 100 lb.

To (P. R. R. stations)	Proposed A	B	C
McEwensville, Penn., to Berwick, Penn., incl.	16	17½	16
To (P. R. R. stations)	**Present A**	**B**	**C**
McEwensville, Penn., to Berwick, Penn., incl.	17½	19½	17½

Reason—Proposed rates are same as now published to Berwick, Penn., for D. L. & W. R. R. delivery.

25222. **Trap rock, lime rock, broken stone and stone screenings,** in bulk, carloads (See Note 3), from Jamesville, N. Y., to Alford, Penn., \$1.10; Kingsley, Foster, Nicholson, Factoryville, La Plume, Dalton, Glenburn, Clarks Summit, Penn., \$1.20; Scranton, Elmhurst, Moscow, Hollisters, Penn., \$1.30; Lehigh, Gouldsboro, Tobyhanna, Pocono Summit, Mountain Home and Cresco, Penn., \$1.40 per net ton. Reason: Rates compare favorably with others involving like hauls.

25234. **Cement,** carloads, from Binnewater and Brixment, N. Y., to various points in Maryland. Rates ranging from 17c to 19½c per 100 lb. Present rates ranging from 27½c to 33½c per 100 lb. Reason: Proposed rates on same basis as now applicable between points in Trunk Line territory.

25240. **Cement,** carloads, from Brixment, N. Y., to Alburgh Springs and East Alburgh, Vt., 21c per 100 lb.

25006, Sup. 1. **Cement,** carloads, to N. Y. N. H. & H. R. R.:

From Alsen, N. Y.	Prop.
Great Harrington, Mass.	11½
Van Deusenville, Mass.	11½
From Binnewater, N. Y.	
State Line, Mass.	11½
Westfield, Mass.	13
Holyoke, Mass.	13
Southampton, Mass.	13
Easthampton, Mass.	13
Northampton, Mass.	13
Florence, Mass.	13½
Leeds, Mass.	13½
Haydenville, Ill.	13½
Williamsburg, Mass.	13½
Hatfield, Mass.	13
Whately, Mass.	13
South Deerfield, Mass.	13
Deerfield, Mass.	13
Turners Falls, Mass.	13
Fitchburg, Mass.	14½
South Fitchburg, Mass.	14½
Sherborn, Mass.	15
South Sherborn, Mass.	15
Medfield Junction, Mass.	15
Central Vermont Ry.:	
Rouses Point, N. Y.	16
East Swanton, Vt.	16

Rates in cents per 100 lb.

25243. **Fiber wallboard,** carloads, minimum weight 40,000 lb., from Camden, N. J., to various points in Arkansas, Oklahoma, Texas and Louisiana. Rates ranging from 70c to \$1.15 per 100 lb. Reason: Rates comparable with rates from other shipping points in Trunk Line territory involving same distances.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

21142. **Scrap mica** (See note), minimum weight 60,000 lb. Note—To apply on material having value for grinding or pulverizing only. From Bristol, Cardigan, Keene and Rumney, N. H., to Richmond, Va. Present—5th class as per B. & M. I. C. C. A1860; proposed—28½. Reason—To establish a commodity rate comparable with other commodity rates now published.

WESTERN TRUNK LINE DOCKET

1278F. **Plaster, plasterboard and stucco,** carloads, as described in Item 23 of W. T. L. Tariff 29K, from Fort Dodge (Group 1) and Centerville (Group 2), Ia., to East St. Louis, Cairo and Gale, Ill., when destined to Missouri points, except St. Louis, Mo. Rates:

To	Present Ft. Dodge Grp. 1	Present Centerville Grp. 2	Proposed Ft. Dodge Grp. 1	Proposed Centerville Grp. 2
East St. Louis:				
Min. wt. 40,000	19½	17	17	14½
Min. wt. 60,000	18	15½	15½	13
Cairo:				
Min. wt. 40,000	21½	19½	19	17
Min. wt. 60,000	20	18	17½	15½
Gale:				
Min. wt. 40,000	21½	19	19	16½
Min. wt. 60,000	20	17½	17½	15

6800-B. **Sand,** carloads (See Note 3), but in no case less than 40,000 lb., from Bowes, Ill., to Waterloo and Fort Dodge, Ia. Rates in cents per 100 lb.:

To	Miles	Pres.	Prop.
Waterloo	232	12	9
Fort Dodge	330	16	11

2556-R, Sup. 1. **Sand,** carloads (See Note 2), but not less than 40,000 lb., from Red Wing, Minn., to Racine and Sheboygan, Wis. Rates:

	Present	Proposed
Racine	190c per net ton	160c per net ton
Sheboygan	240c per net ton	160c per net ton

5927. **Silica sand,** carloads, from Browntown, Wis.

To Iowa points

	Pres.	Prop.		Pres.	Prop.
Buffalo	\$2.00	\$1.60	Muscatine	2.00	1.60
Linwood	2.00	1.60	Burlington	2.00	1.60
Montpelier	2.00	1.60			

I. C. C. Proposed Reports

23281. Building Lime. Washington Building Lime Co. vs. B. & O. et al.. Examiner Roy E. McKee has found the rates on building lime, Engle, W. Va., to Charlottesville, Hampton, Portsmouth and Virginia Beach, Va., inapplicable in certain instances. Certain shipments found misrouted. Applicable rates over certain routes of movement and over routes over which certain shipments should have moved not unreasonable. Applicable rate over the routes of movement to Portsmouth was \$5.30 a net ton. Applicable rate over the route the shipment should have moved was \$3.40 a net ton, plus \$4 a car which the examiner said was not unreasonable. Shipments, he said, were undercharged. As to shipments to Virginia Beach, the examiner said, the rate of \$3.96 applied was inapplicable over the route of movement; that the applicable rate over the route was \$6.20; that these shipments were misrouted by the B. & O.; and that the applicable rate over the route the shipments should have moved was \$3.96 which, he said, should be found not unreasonable. No damage, the examiner said, resulted from that misrouting. Dismissal is proposed.

Kansas and Oklahoma Cement Producers Ask for Reparation

COPY of a complaint of asserted freight rate overcharges, covering a period of 20 years, which has been filed with the Interstate Commerce Commission, has been received by the Railroad Commission of Texas. The complainants are cement manufacturers of Kansas and Oklahoma, and they seek to have the Interstate Commerce Commission compel 18 different railroads to repay them the amount of freight rate overcharges collected during the last 20 years, with 6% interest, and for a reduction of the existing freight tariff.

The complaint was signed by the Iola Cement Mills Traffic Association, Ash Grove Lime and Portland Cement Co., Dewey Portland Cement Co. and the Monarch Cement Co., alleging the rates charged on their products to Texas and New Mexico have been discriminatory and unjust since 1910, causing direct losses. The petition cited that cement mills located at Fort Worth, near Dallas, Harrys, Texas, and Ada, Okla., are favored in the existing schedules. The Texas railroads which were cited as using unfair rates include the Chicago, Rock Island and Pacific, the Atchison, Topeka and Santa Fe, the Missouri-Kansas-Texas, the Texas-New Mexico, the Texas and Pacific, the Wichita Valley, the St. Louis and San Francisco and the Panhandle and Santa Fe.

Ohio Fluxing Stone Rates

THE Interstate Commerce Commission, by means of a supplemental order in No. 23625, rates on raw dolomite and fluxing stone within the state of Ohio, has instituted an inquiry into the situation produced by orders of the Ohio commission on April 10, 1929, to determine whether the orders covering rates on raw dolomite and fluxing stone within that state, will cause any undue or unreasonable advantage, preference or prejudice as between persons or localities in intrastate commerce on the one hand, and interstate or foreign commerce on the other hand, or any undue, unreasonable or unjust discrimination against interstate or foreign commerce. All the railroads operating in Ohio have been respondents. The proceeding is to be assigned for hearing at such times and places as the Commission may hereafter direct.

Cement Rates Reduced

THE Interstate Commerce Commission has announced a reduction in freight rates on cement between Louisville, Neb., and Minneapolis and St. Paul, Minn., to take effect January 26. The cut is from 17 to 16 cents per 100 lb., or about 4 cents a barrel.

Tentative Safety Rules for Quarries

Standards for Rock Products Industries Proposed for a Year's Trial

PLANT MANAGERS, DEPARTMENT SUPERINTENDENTS AND FOREMEN are individually responsible for the safety of their men and for their safe working whether or not specifically provided for in the following regulations:

1. A PLAN OF ACCIDENT PREVENTION BASED ON:
   (a) Thorough instruction of men as to the hazards of their work.
   (b) Clear and complete explanation of rules.
   (c) Enforcement and strict compliance with all rules by every employe.
2. Warning signs must be posted at points of danger, indicating the safe practice required.
   Examples:
   1. "Do not oil or grease this equipment while in motion"—where guards are not provided, because this work may be done when equipment is shut down.
   2. "Stand clear of overhead operations" such as cranes, derricks, shovels.
   3. "No smoking," "High voltage."
   4. "Do not enter rail enclosure while equipment enclosed is in motion."

   The spirit of this requirement is to have warning signs where needed and practical as a constant reminder to employes and to forestall any possible excuse that they "didn't know."
3. Superintendents, foremen, their assistants and any persons whose work deals with specific problems shall be thoroughly familiar with all state and local laws and regulations pertaining to them. They are responsible for and must see that operations are in compliance with these.
4. Superintendent or assistant superintendent shall inspect each working place at least once each week. A special inspection must be made after a period when the location has not been operated.
5. Foreman shall examine daily all machinery and appliances and make sure they are in safe working condition.
6. Foreman must see that proper clearance is maintained on all haulage ways and working areas so that workmen have sufficient room to perform their duties.
7. Strangers or visitors are permitted only with proper pass and shall be accompanied by a foreman or someone designated by the superintendent.
8. INJURIES AND ACCIDENTS:
   1. Report immediately and completely on proper forms.
   2. Be sure any men who receive minor injuries report them and receive first-aid at once.
9. GUARDS:
   1. Plant and equipment must be guarded to satisfy requirements of Industrial Safety Standards, or your particular state, if they are more rigid. Consideration must be given recommendations of insurance company engineers. You are responsible for proper guarding and maintenance of the equipment in your department or under your direction and control.
10. HOUSEKEEPING:
    Piling must be safely and neatly done. All aisles must be kept clear. Good housekeeping is the responsibility of the head of each department and operating unit.

THESE RULES were adopted on October 2, 1930, by the Quarry Section of the National Safety Council, with the understanding that they are subject to such changes as their use for one year by members of the Section may necessitate.

Safe Practice Rules

(FOR ALL EMPLOYES—ALL DEPARTMENTS)

1. Liquor is not permitted on the job. No employe shall come on the job under the influence of liquor.
2. Horseplay or pranks are expressly forbidden and will not be tolerated on the premises.
3. YOUR JOB:
   (a) Ask your foreman anything you don't understand. Know your job; don't guess.
   (b) Co-operate with "the other fellow." You may need his help some time.
   (c) Do not change work or working place without specific orders to do so from your foreman.
4. Unsafe practices—Help to correct these by reporting them immediately to the foreman.
5. Clothing—Do not wear loose or ragged clothing. Keep sleeves buttoned and wear overall jackets inside overalls.
6. Injuries—Report immediately to your foreman, no matter how slight they may seem. Blood poisoning usually starts from slight cuts, blisters, etc. Get first-aid at once.
7. Riding on standard or narrow-gage equipment or any moving machinery when not specifically a part of your job is forbidden.
8. Tools and equipment—Be sure they are in good condition before using. If in need of repair, report this to your foreman at once.
9. When entering or leaving premises use regular walkway. Never climb stonepile, face or incline in quarry.
   (a) Never throw any material over face of quarry.
10. Do not ride loaded skips, cages, buckets or cars while being hoisted or on empty skips, cages or buckets when there is a loaded one in opposite shaft.
11. Cross main line or incline railroad tracks only at regular crossing. Use overhead bridges where available.
    (a) Do not "walk the pipe line" unless proper ropes or hand rails have been provided.
12. When firing signals are given, get into shelter assigned to you at once.
13. Do not touch any equipment, tools or explosives unless required to do so as a part of your job.
14. Report all defects or damage to equipment or tools to foreman for immediate repair.
15. When lifting heavy equipment or materials get assistance. Do not overtax your strength.
16. MACHINES AND MACHINERY:
    1. All gears, shafts, sprockets, belts and revolving set screws must be guarded.
    2. Repairing, oiling or wiping of machinery must be done while machinery is not in motion, if at all possible. DO NOT put on belts while machinery is in motion.
    3. When machinery repairs are completed extreme caution must be exercised to see that all persons are in the clear before starting the machinery.
    4. Operators are held responsible for the safe operation of their equipment.
    5. Machine operating and signal men must not talk to anyone while machines are operating.
    6. Your machine requires care and must be kept clean to allow inspection of all parts at any time.
    7. When reporting needed repairs give complete details of trouble.
    8. Do not fill gasoline tanks while engine is running.
    9. Keep gasoline away from open lights and exhaust pipes.
    10. Keep floors free from oil. Be careful not to slip on metal floors which are wet.
    11. No employe will be permitted to use a cutting or welding torch until he is properly instructed by a competent person, and proper type goggles must be worn by the operator.
    12. Do not use leaky hose on acetylene and oxygen tanks—inspect the hose before using.
    13. Gages on acetylene and oxygen tanks should be inspected periodically in order to make certain that they register correctly.
    14. When handling oxygen and acetylene tanks great care should be taken not to drop or bump them.
    15. Employes should be careful of poisonous fumes when cutting brass or zinc and a gas mask should be used when performing such work.
17. ELECTRICAL:
    1. Persons not employed in powerhouses and switchboard rooms must KEEP OUT of them.
    2. Electrical current should never be

turned on to lines until it is certain that lines are clear.

3. Electrical work must be performed with lines dead, when possible, and when electrical lines or apparatus are undergoing repairs suitable signs should be hung on the disconnecting or starting switch cautioning against closing the switch.

18. BINS, SILOS, ROCK PILES:

Any employe designated to enter chute at crusher, rock or plaster bin, silo, or to work at or on steep face of rock pile, or sand bank (height 12 ft. or more) must wear safety harness, with someone present at the place of entrance during the time the man is working.

19. Emery wheels or other grinding apparatus shall be used only with required eye protective equipment in place and in good condition—goggles or eye shields—as occasion may demand.

20. All guards provided must be kept on equipment while it is operating. If repairs have been made, guard must be replaced before equipment is again started.

21. Do not stand or sit on tracks to talk.

22. ALL HOISTING CABLES AND CABLE CLAMPS:

1. Where both men and rock are hoisted, shall be examined twice during each hoisting shift, once at the beginning and once in the middle of shift, under direction of foreman.
2. If 10% of wires of a cable are broken the cable must be replaced.

23. VERTICAL LIME KILNS:

1. A vertical kiln frequently hangs up at the time that it is drawn so that it is necessary to resume firing in this condition. Under such circumstances, whenever the doors of the furnaces are opened, operators should keep the head down as a protection against the flame if the kiln drops at that time.
2. Tramways across tops of kilns should be well constructed with ample walkway and an extension of the platform between the kilns so as to catch any stone that may fall from a car when crossing the tops of the kilns or when being dumped.
3. Do not leave hot pokers lying on the ground. Always work with reasonably cool poker. Do not use bent pokers.
4. No man shall enter the top of the kiln except that he be provided with life belt or a safely tied loop of rope and with two other men on top of the kiln to effect his rescue in case of asphyxiation.
5. Do not dump cars containing accumulation of water into hot kilns.

Explosives

1. Do not smoke while using or handling any explosives.
2. Do not handle explosives near open lights, other fire or flame or sparks.
3. Do not use any tools other than wooden wedges and wooden mallets for opening cases containing high explosives.
4. Do not drive a hole into a keg of blasting powder, but open the keg by removing the slide from the bung.
5. Do not use frozen explosives or attempt to thaw frozen dynamite.
6. Do not leave high explosives, blasting caps or electric blasting caps exposed to the direct rays of the sun.
7. Do not use metal tamping sticks or tamping rods in loading or tamping (stemming) explosives.
8. Do not force a cartridge of high explosives into a bore hole.
9. Do not explode a charge to spring or chamber a bore hole and then load another charge into it before it has cooled sufficiently.
10. Do not use old or damaged leading or connecting wire in blasting circuits.
11. Do not connect up or load bore holes for electric firing during the approach or progress of a thunder storm and if charges are already loaded and connected, all persons should be kept at a safe distance from them while the storm is in progress.
12. Do not have electric wires or cables near detonators, explosives or charged bore holes at any time except for the purpose of firing the blast.
13. Do not fire a blast until every one is warned and guards are stationed on nearby highway approaches.
14. Do not attempt to investigate a misfire too soon. When fuse and blasting caps are used at least an hour should be allowed before returning to a misfire. In the case of electric blasting caps at least 15 minutes should be allowed.
15. In case of misfired charges in well drill holes part of the tamping may be removed and a small charge placed and fired near enough to explode the main charge. In plugger drill holes another hole should be drilled at a safe distance away, but with the view of exploding the missed charge. Great care should be taken to recover any explosives from a misfired charge.
16. Do not lace safety fuse through dynamite cartridges.
17. Do not cut fuse on a slant, but cut it square across. Cut off an inch or two of fuse to insure having fresh end inserted in blasting cap, and see that the fuse is seated against the detonating agent in the cap.
18. Do not use short fuse; cut fuse sufficiently long to extend beyond collar of hole and for perfect safety.
19. Do not crimp blasting caps to fuse with pliers, knife blade or with the teeth, but see that the blasting cap is securely attached to the fuse by means of a suitable cap crimper.
20. Do not allow priming (placing of a detonator in the dynamite cartridge) to be done in a magazine.
21. Do not make up primers, that is, do not insert a blasting cap or electric blasting cap in cartridges of explosives before it is actually necessary.
22. Do not use any detonator weaker than a No. 6.
23. Do not attempt to remove or investigate the contents of a blasting cap or electric blasting cap.
24. Do not carry blasting caps or electric blasting caps in pockets of clothing, or in the bed or body of a vehicle containing other explosives.
25. Do not store blasting caps or explosives in any home, boarding house or other human habitation, or leave them lying around where children can get hold of them.
26. Do not leave explosives in a wet or damp place. They should be kept where it is clean, cool, dry and well ventilated.
27. Do not store explosives so that cartridges stand on end.
28. Do not store fuse in a hot place, as this may injure the fuse and cause the waterproofing material to damage the powder train.
29. Do not handle fuse carelessly in cold weather. When cold it is stiff and breaks easily. It should be warmed slightly before using.
30. Do not have matches about you unless they are safety matches.
31. Do not allow explosives or drill holes (while being loaded with explosives) to be exposed to sparks and wherever practical a portable shed shield of fireproof construction should be used.
32. Do not attempt to take blasting caps from a box by inserting a wire, nail or other sharp instrument.
33. Do not spare force or energy in operating blasting machines.
34. Do not connect leading wire to blasting machines or allow it to come into contact with any other source of electrical current until immediately before firing and everyone is in a safe place.
35. Do not handle packages of explosives violently or slide them along floors, or over each other.
36. Number of pop shots fired in one round should be governed by local conditions (such as area over which shots are distributed) and pop shooter should seek shelter when warning cap explodes.
37. When dynamite is removed from the wrapper in loading, wrappers should be put in holes.
38. Before firing make sure all passageways are guarded or flagged and everybody is clear of the blast. Sound warning signal.
39. In case of misfire or blown-out shot, no one may tamper with hole. It shall be marked out and foreman notified immediately. He shall personally direct the work. Charge must never be dug out with an iron or metal spoon or tool. No one may drill into it. Another hole shall be drilled at least 2 ft. away and running away from the misfired shot.

Drilling and Barring

1. You must watch for any missed shots or loose pieces of dynamite and report these to foreman immediately.
2. Machine runners, loaders and others at the face shall remove all loose rock before beginning work or setting up drill. Report signs of roof crumbing or caving to foreman at once.
3. When working, face quarry so you will see loose stones.
4. Make sure of footing and be particularly careful of slipping and falling when stepping on stones.
5. Warn fellow workmen when starting to bar down rock.
6. Pry down all loose chunks on loading pile to prevent rock rolling.
7. WHEN SLEDGING:
   1. Close eyes at moment of impact so no particles will strike your eyes.
   2. Use proper tongs to hold tools.
8. Drillers must be exceptionally alert at all times.
9. Men must watch for sliding rocks above them.
10. Men must be sure of firm footing before starting to drill.
11. Drill steel may break suddenly. Be in

the clear if this happens, so machine will not fall on your foot or throw you off balance.

12. Do not drill:
    (a) In old holes.
    (b) Within 2 ft. of missed shot.
    (c) Under or into loose rock.

Shovels, Draglines and Derricks

1. Only regular operator, or one specifically designated by foreman, may operate these machines.
2. Inspect all parts daily and have defective parts repaired at once.
3. Use a safety dog on the boom cables in addition to foot brake control.
4. Place shovel in position to see all of loading operation and know exact position of men who may be working near shovels.
5. Lower boom slowly to eliminate swinging of bucket.
6. Load cars so that rock or dirt will not fall off while in transit.

   Do not stand close to cars being loaded.

   Operator must not swing loaded bucket over locomotive.
7. Put stones which are too large for loading behind or out of the way, so they may be broken up by a small blast.
8. Keep all cables well lubricated.
9. Oil and repair in daytime. Stop machinery and place bucket on ground. If necessary to oil sheaves at night, two men must be present.
10. When making repairs, operator himself must move or place boom.
11. Lock door on crane house while repairs are being made so that no one can tamper with machinery.
12. If necessary for someone to climb legs of stiffleg, be sure man doing this is alert and physically able to do the work well.
13. In stripping, remove overburden far enough back from face so that rock or other material may not fall over face.
14. Men must not work where shovel or dragline buckets may swing over them.

Railroad

TRACKMEN

1. When working on track place a yellow flag 300 ft. on either side of working place.
2. Trains must not be permitted to pass along any track until all repair work is completed.
3. When two or more men are carrying a rail or other heavy material be sure every man is ready to drop it at same time.

TRAINMEN

1. No one except engineer, brakeman or electrician is permitted to operate locomotive. Exceptions may be made only by foreman.
2. Switches must be set for main track and locked. Keys must be kept on locomotive.
3. When repairing locomotive a red flag must be displayed. No coupling or moving of trains is permitted at this time.
4. While oiling locomotive, inspect all parts. Report defects to foreman for immediate repair.
5. Trainmen must not permit anyone except those whose duty it is to ride equipment.
6. TRAINS OR LOCOMOTIVES IN MOTION:
   1. When about to move and while moving and when crossing roads locomotive bell must be kept ringing.
   2. When approaching crossing, sound two long and two short blasts of locomotive whistle.
   3. When shunting cars in yards a trainman must be in position to signal engineer or to control moving cars.
7. All other than main track locomotives—or those on extra trips not scheduled—must be unusually careful when on main track. Trainmen must determine in advance that track is clear.
8. Coupling is dangerous. None but experienced trainmen may do this work.
9. Where quarry cars are hoisted up an incline, the space under this incline should be railed off so that there is no danger from a stone dropping from a car. In case there is a thoroughfare under the incline, then men should not pass under the incline when cars are being hoisted.
10. Overloading of cars. The change of angle due to going up an incline will cause stone to slip which was well placed for a level movement.

Industrial Safety Training at a Mining School

ALTHOUGH SOME engineering colleges recognize the importance of instructing young engineers in industrial safety, the different institutions handle this instruction in various ways. It is believed that a recent industrial safety course, conducted at the Colorado School of Mines through the co-operation of this school and the Bureau of Mines, U. S. Department of Commerce, presents some unusual features that are of interest to other schools and to the mining public. They are described in Information Circular No. 6349, written by E. H. Denny, district engineer, and G. M. Kintz, associate mining engineer.

The course as conducted schedules among other studies:

A first-aid course for all students same as that given by the Bureau of Mines during the fiscal year 1930 to more than 112,000 persons in the mining and petroleum industries and has been given to all upper classmen annually at the Colorado School of Mines for a number of years. In five evening lessons the control of bleeding, artificial resuscitation, the bandaging of wounds, the splinting of fractures, and the treatment of shock are taught through lecture, demonstration, and actual application of bandages and splints by class members. It is considered that such first-aid training not only promotes the saving of life and minimizing of injury by prompt and effective treatment of an injured person when accident occurs, but also

An unusual photograph of the operating force at the North American Cement Corp. Security plant, Hagerstown, Md., gathered article on North American safety

tends to prevent accidents through the predisposition of a person trained in first aid to think and to act safely.

Outline of General Safety Course

Importance of safety to the nation and the individual.

The purpose of the United States Bureau of Mines; details of its work toward safety and efficiency in the mineral industries.

Accident statistics.

(a) by whom compiled and where available.
(b) frequency and severity bases.
(c) lost-time accidents, fatalities, permanent disabilities, non-injury accidents.
(d) comparative accident experience of various industries.

Economic losses in industry due to accidents.

(a) over $2,000,000 annual loss to employer, employe and public through accidents.
(b) direct and indirect costs of accidents to employers.

Compensation laws.

Comparison of mine accident rates in the United States and Europe.

Organization—purpose and description of various company safety organizations.

Safety education of officials and employes.

Discipline.

Safety records of companies having good safety records showing financial saving to companies.

Electrical safety (by officials of an electric company).

(a) handling of disconnecting switches.
(b) the installation and removal of station grounds.
(c) safety practice in servicing a line.
(d) fuses.
(e) electric fire extinguishment.
(f) types of men desirable for electrical work.
(g) types of insulating material.
(h) tests of insulating material for safety.

Safety in the use of explosives (by an explosives engineer of an explosives company).

Hazards Created During Winter Months

By Charles T. Roth

General Safety Inspector, Northern Division, Pennsylvania-Dixie Cement Corp., Nazareth, Penn.

LOW TEMPERATURES and snow contribute numerously to hazards and we shall therefore attempt to remind you of them. The quarry and stripping departments are affected more seriously than others and the nature of the work makes it extremely hazardous during the fall, winter and spring.

The approaches to the quarry and the working points in the quarry should be well cleaned and cleared of any loose rock, or materials, as they are frequently covered with sheets of ice or snow and unless surroundings are in good condition slipping and falling will result, a hazard with an alarming toll of accidents each year.

With the first sign of frost, stone banks and shovel stockpiles become frozen and the sun shnining upon them thaws the frozen clay and rock, which will slide with little or no warning. At no time should stone banks or stockpiles be worked upon without very close supervision by the foreman or a capable person authorized by the foreman.

Dinkeys should have sand boxes filled at all times, and particularly during this period, sand pipes should be thoroughly cleaned to insure proper discharge of sand. Before sand is placed in a sand box, someone in authority should inspect it to determine the amount of moisture present.

The blasting crew should reduce the number of secondary shots to be fired at one lighting because the slipperiness of ice covered rocks creates a hazard and a slip on a rock might mean that one of the crew would not be able to reach shelter if hurt in the least way from the fall.

While the winter months add no increased hazards to the operation surrounding the mill itself, we cannot help but state that all icicles should be removed from buildings at the start of each shift, particularly at doorways or openings in buildings.

Special care should be exercised for the removal of snow and ice. However, with the best care, slipperiness from icy pavements cannot be overcome and the greatest precaution that can be taken is by yourself; make it your duty to exercise special care on slippery surfaces and report any such conditions, that come to your notice, to your superiors. Steps should be free from ice and snow at all times. Men engaged to fill water tanks where the overflow is not connected to sewerage line should exercise special attention that the tank does not overflow and icy pavements develop therefrom.

Extreme care should be exercised by men engaged in shifting of railroad cars in yard. Before shifting cars brake chains should be inspected and snow and ice removed from brakemen's platform of car. The brake ratchet should be used whenever cars are being dropped so that kickback from braking wheel be overcome.

Goggles should be worn in general on windy days.

Truck drivers should not fail to have chains on wheels of trucks whenever roads are icy or slippery in any way.

to commemorate the celebration of its first accident-free year recently and described in Safety Director Couchman's interesting activities in our issue of November 8

Outstanding Safety Record by Medusa Mills

By W. M. Powell
Safety Director, Medusa Portland Cement Co.

THE year 1928 closed for our company with an accident record that was nothing to write home about. Our five plants had reported a total of 79 accidents or an average of about 16%. This was very discouraging in view of what other plants had been doing in the way of winning trophies and generally reducing the number of accidents. Over the industry as a whole, the Portland Cement Association figures showed an average of only 6.7 accidents per plant, so as a group we were far below the average.

Beginning the first of January, 1929, W. L. White, Jr., our general superintendent, and myself made the rounds of our plants, called our safety committees together and made an appeal for greater effort on the part of the committees toward the reduction of the number of accidents. Mr. White gave the committees to understand in plain language that he and the directors of our company were behind the safety idea and were earnest in their desire to see our accident record improved.

The first six months I spent going from plant to plant, remaining a week at a time at each plant, getting acquainted with the men and endeavoring to get the message of safety across to each individual employe personally right at his job.

The decrease in accidents was apparent almost at once. Later on we started a series of plant mass meetings and then general meetings to which the families were invited. We also secured copies of "Safety at Home" from the National Safety Council and sent them into the homes with a personal letter appealing to the wives and mothers for their co-operation in keeping the safety thought foremost in the minds of their men folks.

Our president, J. B. John, and our vice-president, E. J. Maguire, attended our mass meetings from time to time and addressed our men on the importance of being careful, stressing that the safety of the worker must come before production or anything else.

The program was kept up continuously during 1929 and is being carried on this year. The directing personnel at all the plants were interested and were taking an active part in the work and when 1929 had passed on and we tallied up our score, we found that we had won two Portland Cement Association trophies and had made a reduction of 40% in the number of accidents and a reduction of 26% in lost-time days. In figuring the lost days we included the penalties for fatal and permanent disabilities.

Our eight plants suffered a total of 48 lost-time and fatal accidents, an average of six accidents per plant as compared with the average of 5.25 for all the plants reporting their accidents to the Portland Cement Association. For the country over, about one plant in five won a trophy for accident-free operation. In our organization one plant in four qualified for this award.

This looked more gratifying and by the time 1930 got under way the men at the plants were asking for permission to stage safety rallies, offering to finance them themselves; and they did put on some very good ones, appointing their own committees and securing speakers and arranging for the complete program. The company footed the bill, feeling that it would not be square to do otherwise.

January 1, 1929, we took over the Crescent Portland Cement Co.'s plant at Wampum, Penn., and in January, 1930, the Manitowoc and Newaygo Portland Cement Co.'s plants at Newaygo, Mich., and Manitowoc, Wis.

The personnel of these plants from top to bottom was in full accord with our program and we just all melted into one body with one grand purpose in mind: to help each other put this safety idea over with a bang.

At this writing in all our eight plants, we have had one lost-time accident this year. That single accident was a bitter dose to swallow and it fell to one of the plants which had been a trophy winner in 1929 to take it.

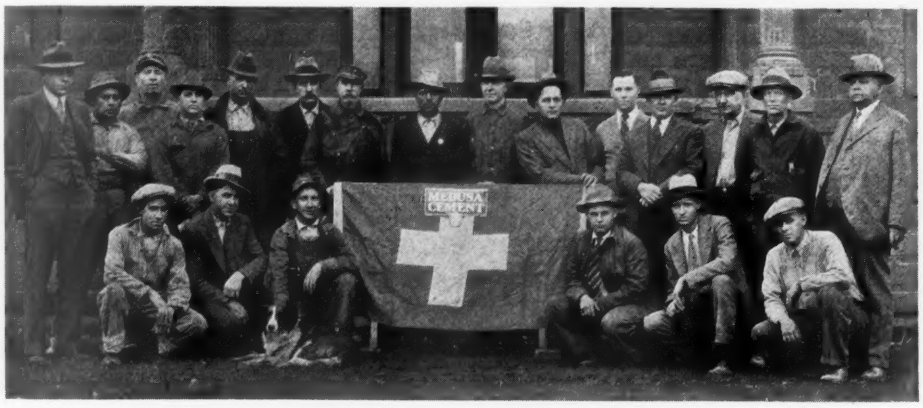
R. J. Landis, superintendent of our York (Penn.) grey mill, in which this accident occurred, said in speaking of it: "I am sorry it had to come, but if any of us had to get it I am glad, in a way, that it came to us. I know how it feels to win a trophy and I wouldn't want any of the rest of our plants to miss the chance. I would not want my worst enemy to feel the way I do about losing it again."

That is typical of the fine, unselfish spirit manifested all through the organization and is more than anything else responsible for what we accomplished in the prevention of accidents.

The dates of our last lost-time or fatal accident in each of the Medusa plants are as follows: Toledo (Ohio), April 5, 1928; Wampum (Penn.), July 29, 1929; York (Penn.) white plant, September 12, 1929; Manitowoc (Wis.), October 2, 1929; Bay Bridge (Ohio), November 2, 1929; Dixon (Ill.), November 14, 1929; Newaygo (Mich.), December 11, 1929; York (Penn.), grey plant, June 26, 1930.

Medusa Plants at Bay Bridge and Dixon Celebrate Safety

TWO more plants of the Medusa Portland Cement Co., at Bay Bridge, Ohio, and Dixon, Ill., recently celebrated completion of 365 days without lost time or more serious accident. As this was a new record for both of these plants, the two oldest operated by the company, the new record called for fitting acknowledgment, which came in the shape of "pep" parties at both plants.



Safety committee at Dixon plant of Medusa Portland Cement Co.: W. L. White, Jr., general superintendent, standing at left; W. M. Powell, safety director, standing fourth man from right; W. E. Wuerth, superintendent, standing at right; Phillip Mooney, engineer and chairman of committee, kneeling at right of flag

As October 30 marked the passing of a year at Bay Bridge without accident, the celebration there was held on Saturday evening, November 1. The object of the meeting was obviously to accumulate sufficient additional safety momentum to capture the Portland Cement Association trophy by completing the year 1930 without personal injury. And the evening produced an exhibition of safety interest exceeding anything of the kind previously experienced at Bay Bridge.

The speakers included: W. F. Johnson, safety director of the New York Central

lines, who made the principal address; W. L. White, Jr., general superintendent; W. J. Worthey, superintendent of the Medusa plant at Toledo; W. M. Powell, safety director, and Rev. Braun of Venice, Ohio. Movies, an orchestra and group singing were the principal entertainment numbers. A. J. Little, superintendent of Bay Bridge plant, acted as master of ceremonies. A fine buffet supper was provided as a concluding feature and the crowd departed fully determined to capture the Portland Cement Association trophy.

The Dixon plant of the Medusa company is the sixth Medusa mill organization to complete 365 days without lost time or fatal accident, and the achievement of this result at Dixon was of more than usual interest because the improvement in the mill record has been unusually rapid. Two years ago, Dixon plant, in the midst of a program of reconstruction, was within a few places of the bottom position on the Association accident record. By safety leaders it was considered a "problem plant" and by some of the men, a sort of "jinx."

In two years Dixon has climbed into the top class and is now almost assured of its objective, the Portland Cement Association trophy. As indicative of the enthusiasm prevailing at that mill, there was a voluntary 100% attendance at the Elk's Club on November 15 when a year's clear record was celebrated.

Phillip Mooney, plant engineer, was master of ceremonies and as such directed an unusually snappy program. H. A. Parrish, safety director of the Chicago and Northwestern Railway, was the principal speaker. His motion pictures as well as his address were beneficial and greatly appreciated. E. J. Maguire, vice-president and treasurer of Medusa, was present and made a very inspiring talk. W. L. White, Jr., general superintendent, W. E. Wuerth, superintendent, W. M. Powell, safety director, Mr. Bennett of the Reynolds Wire Screen Company, Dr. E. S. Murphy, the plant surgeon, Dr. David Murphy, R. W. Sterling, president of the Chamber of Commerce of Dixon, and A. P. Armington, president of the Dixon National Bank, also spoke.

A spirited ovation occurred when superintendent ("Dad") Wuerth was called upon by the chairman. Mr. Wuerth, always a man of extreme modesty, was unable to keep himself longer in the background. As others seemed to climb faster in accident prevention than the force at Dixon, Mr. Wuerth never lost faith in his men.

Canada Cement to Rebuild Port Colborne Plant

THE CANADA CEMENT CO. in Humberstone township, near Port Colburn, Ont., will build a new plant, which will cost upwards of $500,000, if a fixed assessment of $250,000 is passed by the rate payers on January 5.

L. M. McDonald, superintendent of the plant, stated that construction will commence March 1 if the assessment is granted. If it is passed it will mean that the Canada Cement Co. will remain here another 25 years, but, should it be defeated, the plant will be removed to Beachville, Ont., where limestone rock is found in abundance. The new plant will use the wet process of manufacture, eliminating the dust problem.—*Buffalo* (N. Y.) *Courier Express.*

President of International Cement Quoted on Policies

PRINTERS' INK, of October 30, quotes H. Struckmann, president of the International Cement Corp., New York, as follows:

"Our company as a matter of policy has always maintained its properties in an up-to-date efficient condition, with the result that we are in a position where we can obtain the advantage of all the latest improvements in the art of manufacturing and distributing cement, and consequently keep our manufacturing costs at the minimum, at the same time maintaining a very high quality for our product.

"The efficiency of our plants and our methods of distribution have contributed greatly to the success of our operations for this year to date; but there is still a more important factor, and that is the wide distribution of our properties and the advantageous location of each of the plants to serve some particular market.

"In the acquisition or construction of plants, the management has always considered proper location as of fundamental importance. We believe it has been and will continue to be the greatest contributing factor toward the success of this company."

Mr. Struckmann's statement is a good example of maintaining profits through closer attention to distribution economies, *Printers' Ink* comments. Many makers of heavy products have saved profits similarly.

Lone Star Cement, Texas, Completes Improvements to Dallas Mill

THE LONE STAR CEMENT CO., Texas, is completing an extensive reconstruction program begun last spring in West Dallas. In commenting on this building and equipment work, L. R. Ferguson vice-president of the company, said:

"The construction program undertaken by the company last spring had a twofold object: First, to further improve the manufacturing facilities of the company and keep them abreast of the latest developments in the manufacture of portland cement, and, secondly, to provide employment for many of our workmen whom we otherwise would have been forced to lay off and deprive of their income.

"The company is now planning similar activity at its plant at Houston and will, during the coming months, make extensive improvements at that property, which, in addition to still further modernizing its manufacturing equipment, will also provide work for a large number of employes.

"Our construction programs at Dallas and Houston are the answer of our company to the question, 'What is the future outlook for business?' They are a practical demonstration both of our faith in the early return of improved business conditions and in the future prosperity of the South, particularly of the state of Texas."—*Dallas* (Tex.) *News.*

Penn.-Dixie Cement Buys Additional Iowa Quarry Property

THE Pennsylvania-Dixie Cement Corp., has notified Harry Doak and C. S. and S. M. Hamilton, who own land east of Winterset, Iowa, that it is its intention to exercise its options to purchase the land, on or before December 1, 1930. The 189 acre farm belonging to Harry Doak, and the 350 acre farm of Mr. and Mrs. Hamilton are at the east edge of Winterset.

The Penn.-Dixie company started drilling operations last spring on these two pieces of land, to see if the limestone found would be of the proper quality for them to consider the location of a quarry here. It has not made any announcement of its plans, but has notified the local people of its intentions to exercise the options.—*Winterset* (Ia.) *Madisonian.*

The Hamilton 350 acres is to be sold for $150 an acre. The Doak land will bring $130. It is believed that the company will open quarries here next spring and will ship the rock to its plant at Valley Junction.—*Des Moines* (Ia.) *Register.*

Low Water Hampers Knoxville, Tenn., River Gravel Producers

LOW WATER level had gravel dredging almost at a standstill on the river at Knoxville, Tenn., recently.

Oliver King, of the Oliver King Sand and Lime Co., said that gravel dredging had rarely been so handicapped here in the past 40 years. His firm suspended gravel work entirely. Other firms, including the Cherokee Sand and Gravel Co., had also forsaken the big gravel fields above town and were dredging small quantities close in.

"Sand dredging has not been affected so much," W. L. Bamberg, of Oliver King company, explained. "Sand is much more accessible than gravel at low water here.

"The summer drouth is responsible for the present low water level," Weather Observer Sanders said. "There hasn't been sufficient rainfall to bring the river back to normal."—*Knoxville* (Tenn.) *News-Sentinel.*

Fluorspar Mining

THE METHODS AND COSTS of mining fluorspar at Rosiclare, Ill., are given in Information Circular No. 6294, July, 1930, by Edwin C. Reeder, and published by the U. S. Bureau of Mines, this being one of a series of papers by the bureau on mining methods and costs of nonmetallic minerals.

The particular mine described is worked on a single shift at the rate of about 5000 tons of ore per month, and the methods are similar to those of other mines in the district. The vein is 1900 ft. long and practically continuous, with an average width of 12 ft. and a maximum width of 34 ft. The ore is all hoisted up a centrally located vertical main shaft from five levels and dumped directly into the mill bin at the top of the head frame. The main shaft is 6 ft. by 20 ft. in cross-section, 600 ft. deep, with two 5½ ft. by 6 ft. hoisting compartments and a 6 ft. by 8 ft. ladder and pipe compartment. A balanced ore skip and cage are used in the hoisting compartments, the skip holding 3 tons or 54 cu. ft., while the single deck cage is counterweighted to balance the skip, and will carry 14 men. The five working levels are at 170, 250, 350, 450 and 550 ft., where the drifts are carried in both directions on a grade of ½% up from the shaft in order to favor the loaded cars. The main shaft is lined with reinforced-concrete walls 2 ft. thick down to the solid limestone foundation at the 170 ft. level. In addition to the main shaft two vertical air shafts are used, one at the north end 400 ft. deep arranged with a cage and electric hoist for men and supplies, and a ladderway in two compartments, each of 5½ ft. by 6 ft. section, while at the south end a single 5 ft. by 7 ft. shaft 250 ft. deep with ladders is used for ventilation and emergency. The ore skip is loaded at the three lower levels from pockets with air-operated gates and chutes, while the ore from the upper levels is dumped down the raises and trammed to the ore pockets below.

The drifts and cross-cuts are usually 7 ft. high by 8 ft. wide, and about 16 holes are usually necessary to break out a section 4 ft. long. These holes are put in about 6 ft. with 1-in. hollow hexagon steels and air drills and are loaded with 5 or 6 sticks of 1¼-in. by 8-in. 35% ammonia gelatin. The 6 ft. by 20 ft. main shaft requires about 24 to 27 holes. The raises from one level to another are of 5 ft. by 7 ft. section and are worked up from below in 4 ft. rounds or breaks using the same drilling methods and working on a scaffold.

The straight shrinkage system of stoping is used on the lower levels in the limestone formation, and the square set and fill method in the soft ground at the 170-ft. level, the latter making up about 25% of the total mining operation. The stopes are from 100 ft. to several hundred in length and the broken ore is supported on arches except where the vein is very narrow, when stull timbers are used instead. Where the arches are used the bin raises are on about 25 ft. centers. The back of the stope is carried in steps and the broken ore kept 6 or 7 ft. below, the excess being drawn off every day through the bin raises.

Ventilation is by natural draft except that in hot summer weather a 6000 c.f.m. fan is used at the surface of the south air shaft to force air to the 170-ft. level. Very little timbering is used except at the 170-ft. level in the soft material.

All ore is trammed by hand in 22 cu. ft. rotary end dump cars, with 12-in. roller bearing wheels on 18-in. gage track. The labor in all of American stock working on wage scales of from $3.50 to $4.50 per 8-hr. day. As much work as possible is done on contract. Raising and drifting are on footage contracts, at $3 per foot for labor, with a helper furnished on raising above 50 ft.

The average costs for 1929 were as follows:

Labor	$1.773
Supervision	0.051
Drilling	0.144
Power	0.138
Explosives	0.301
Timber	0.082
Other supplies	0.111
Per ton hoisted	$2.600

The total underground labor was 2.73 man-hours per ton, with an average of 2.93 tons per man shift. The labor and supervision was 70% of the total cost, and supplies and power 30%. There were 1.8 lb. of explosive and 1.5 lin. ft. of timber used per ton of ore. The total power used was 10.4 kw.h. per ton, divided as follows:

Air compressor	4.9 kw.h.
Hoisting	1.2 kw.h.
Pumping	3.3 kw.h.
Lighting	1.0 kw.h.
	10.4 kw.h.

Seattle City Engineers Frown on Tinted Concrete Pavements

ARTISTIC DREAMS of tinted concrete paving for Seattle were flitting away at the city hall today under the cold, practical recommendations of the city council streets and sewers committee, voted recently.

The blow fell with particular weight upon the specific proposals of Mrs. Grace Burt, 1730 Magnolia boulevard, who suggested that this attractive drive be done in rose and that sidewalks and pavements in other sections of the city be touched with green and other pleasing tints to break the monotony of plain gray and white.

The council committee's action was taken on recommendations of Maj. Oscar A. Piper, chief assistant city engineer. Maj. Piper's message in turn was supported by a report from Assistant Engineer H. F. Faulkner, the city's concrete expert, who said that coloring of paving and sidewalk material would cost from 32 cents to 90 cents a square yard.—*Seattle* (Wash.) *Times.*

Properties of Fire Clays at Different Temperatures

RESEARCH PAPER No. 194, by R. L. Heindl and W. L. Pendergast, reprinted from the Bureau of Standards *Journal of Research,* August, 1930, is the second report on an extensive investigation of fire-clay refractories being conducted by the Bureau.

Twenty-six fire clays and three samples of quartz and silica sand were furnished for this study by manufacturers of fire-clay refractories.

The geologic formation, chemical analyses, and pyrometric cone equivalents are given in this report, along with information on porosity, shrinkage, thermal expansion, moduli of elasticity and rupture, and plastic flow.

The clays investigated range from the aluminous to the highly siliceous, and are found in the states of Kentucky, Pennsylvania, New Jersey, Ohio, Illinois, Missouri and California.

Monazite, Thorium and Cerium

INFORMATION CIRCULAR 6321, August, 1930, published by the Bureau of Mines, Washington, D. C., contains a great deal of information on these rare metals and minerals, their occurrence, physical properties, preparation and uses, along with statistics on production, markets, etc., and a bibliography. Monazite is the most important thorium-bearing mineral, containing up to 9% thorium oxide and 32% cerium oxide. Although discovered in 1829, it had no commercial significance until these oxides were used in the incandescent gas mantle by Welsbach in 1885, and later for sparking alloys used in pocket lighters. Due to the decline in gas lighting the production and use of these rare metals has decreased over the past 10 years.

Monazite occurs in this country in North and South Carolina, Idaho and Florida, but there is practically no production, most of the small amount now used coming from India. Deposits are also found in Brazil and Australia. In 1929 the price of monazite sand at New York had fallen to $60 a ton.

Most monazites are yellow, varying from a light greenish-yellow to brown, with a resinous or greasy luster and a specific gravity generally over 5.0 so that it is easily concentrated by simple gravity methods. The manufacturing process by which thorium and cerium are obtained from the monazites is long and complex.

Thorium as usually produced is a somewhat brittle grayish metallic powder of small thin crystallized leaflets, with a specific gravity of 11.2. It burns above 120 deg. C. with an intense white light, and is radio-active.

Cerium is a steel gray soft lustrous ductile metal with a specific gravity of 6.9, and is moderately stable in dry air.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Material Producers Making Pipe

Oklahoma Cement Pipe Co., Tulsa, Okla., Owned by Hughes Stone Co. and Price Sand Co.

By Dudley W. Moore

THE new plant of the Oklahoma Cement Pipe Co., Tulsa, Okla., just completed and placed in operation, is of interest not only because of its modern design and flexibility of operation, but also because of the fact that its owners are primarily producers of stone, sand and gravel and have developed this plant for the manufacture of concrete products, as well as for the sale of ready-mixed concrete, to provide a steady outlet for the sale of their materials.

The owners of the pipe company are owners of the Hughes Stone Co. and Price Sand Co. All three of these companies are closed corporations, with separate producing plants adjacent to the city of Tulsa, but are operated under the same management, from the same office, though under separate charters. The new pipe plant also serves as a distributing point for the other companies.

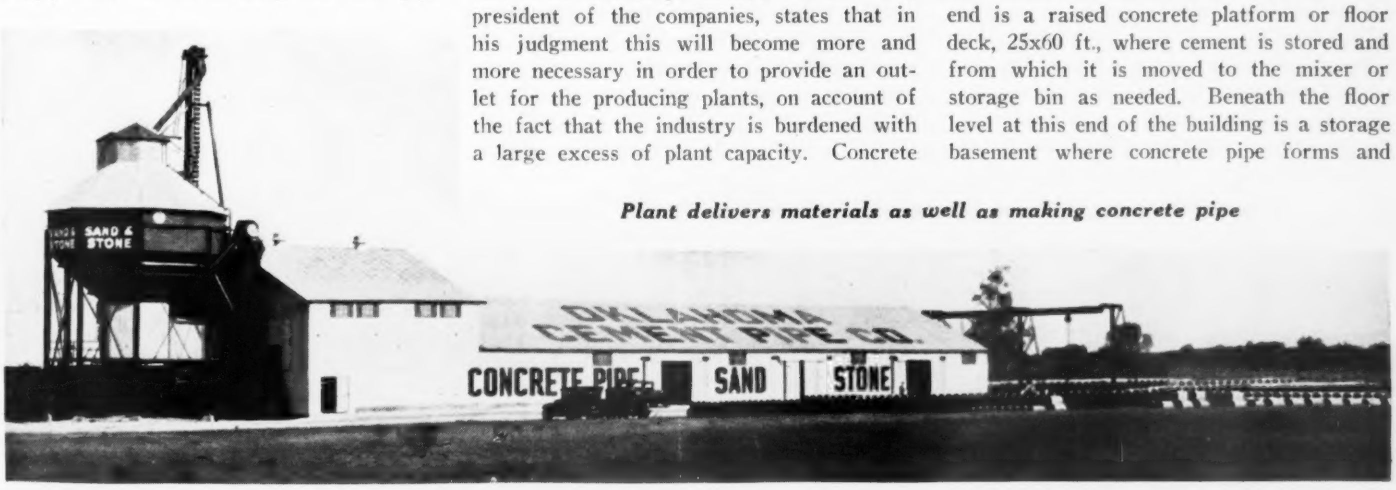
The officers of these companies also own one-half interest in the Builders Concrete Co., which company has the franchise for handling transit-mixed concrete, in Paris transit mixers, in the city of Tulsa and Tulsa county. The principal operating plant for supplying ready-mixed concrete is at another location, adjacent to the Builders Supply Co., but in building the new pipe plant storage and facilities were arranged to make it an auxiliary plant for use by the Builders Concrete Co. whenever those facilities could be used to advantage. Distribution of the transit-mixed concrete is handled entirely by the sales organization of the Builders Supply Co., the officers of the company being owners of 50% of the stock of the Builders Concrete Co.

Curing floor of Oklahoma plant

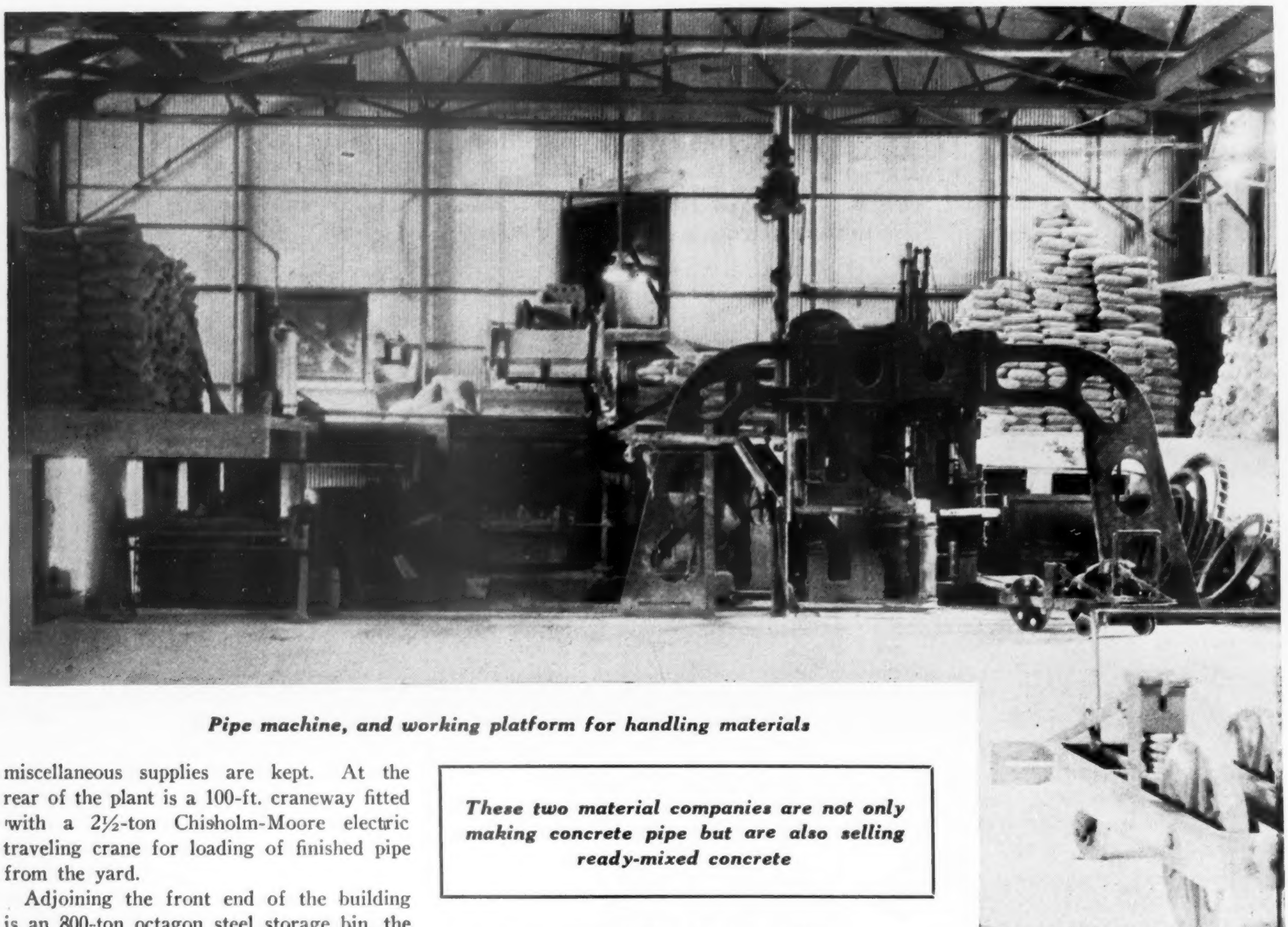
With reference to the advantage of aggregate producers engaging in the manufacture of concrete products, J. M. Chandler, president of the companies, states that in his judgment this will become more and more necessary in order to provide an outlet for the producing plants, on account of the fact that the industry is burdened with a large excess of plant capacity. Concrete products, with which he classes truck-mixed concrete, provides such an outlet. He anticipates a continued increase in the use of the latter and thinks that producers who wish to keep abreast of the times must provide facilities for handling it.

The pipe plant has a daily capacity of 60 to 70 tons of manufactured products, of which storm sewer pipe is a specialty.

The building is of all-steel construction, 60x200 ft., with concrete foundation and full reinforced concrete floor. In the front end is a raised concrete platform or floor deck, 25x60 ft., where cement is stored and from which it is moved to the mixer or storage bin as needed. Beneath the floor level at this end of the building is a storage basement where concrete pipe forms and



Plant delivers materials as well as making concrete pipe



Pipe machine, and working platform for handling materials

miscellaneous supplies are kept. At the rear of the plant is a 100-ft. craneway fitted with a 2½-ton Chisholm-Moore electric traveling crane for loading of finished pipe from the yard.

These two material companies are not only making concrete pipe but are also selling ready-mixed concrete

Adjoining the front end of the building is an 800-ton octagon steel storage bin, the largest ever built for this purpose, having five compartments for storage of stone and sand, also a cement compartment of underslung type.

Materials from the producing plants are delivered in self-cleaning hopper-bottom cars and dumped into a track hopper, conveyed from the track hopper by a steel pan conveyor, manufactured by the United Iron Works of Springfield, Mo., which conveyor discharges the material into a Link-Belt bucket elevator, which hoists it and distributes it into the octagon steel bin, which was manufactured by C. S. Johnson and Co., Champaign, Ill. The elevator is driven by a 10-hp. General Electric motor, direct-connected to a W. A. Jones Foundry and Machine Co. No. 18 spur gear speed reducer.

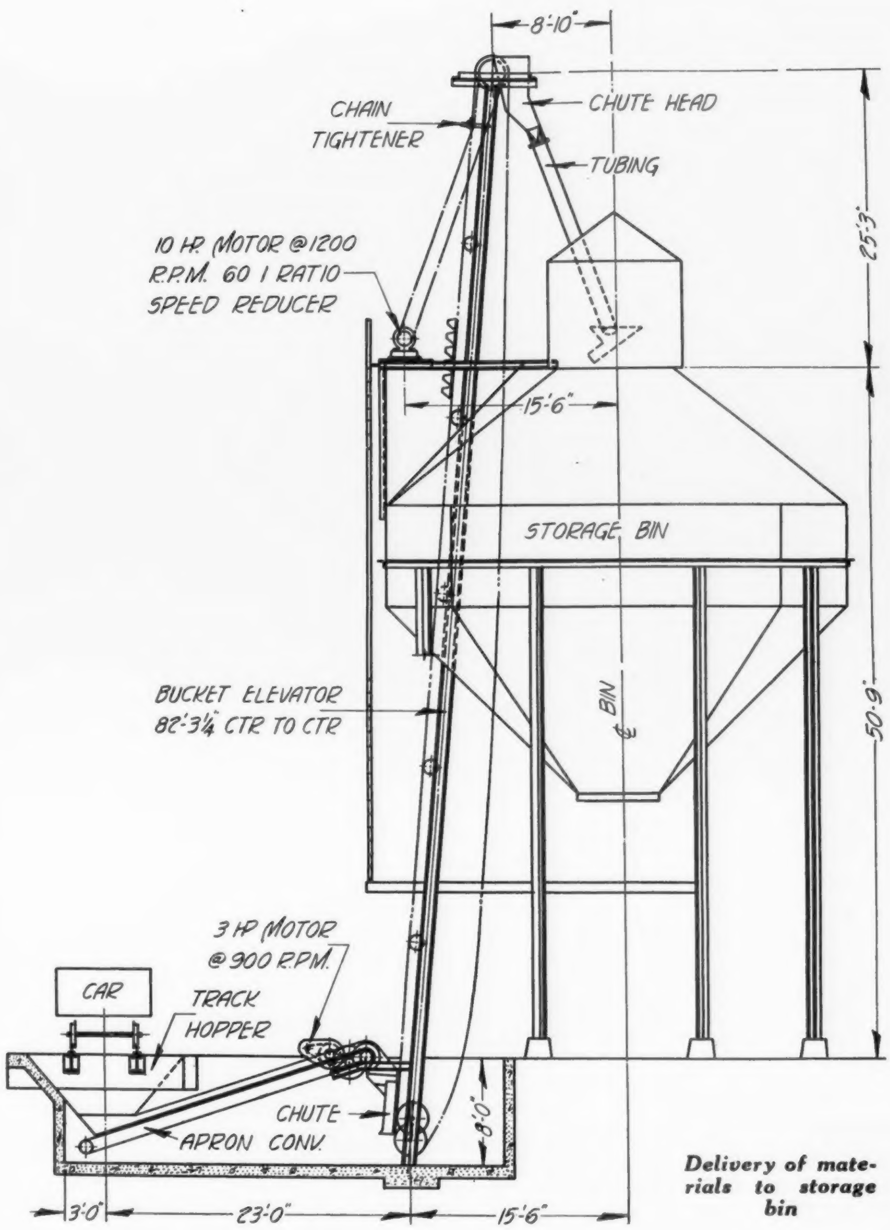
At the top of the bin is a turntable distributing device, controlled by a wheel and bevel gears from the batching floor beneath the bin, so that separate sizes of material required are placed in the compartment reserved for that particular size.

In operation, each of these compartments discharges material by gravity through a gate into a Johnson weighing batcher of 7 cu. yd. capacity, where it is weighed separately and the required amount placed in the batcher. The entire batch is then discharged on to a Link-Belt conveyor system extending from under the batcher to the pipe manufacturing department of the plant.

At this stage it discharges into a Blystone mixer of 21 cu. ft. capacity, and water is added from a measuring tank located beside the mixer. As the batch is discharged from the concrete mixer it is conveyed to the pipe-making machine, a heavy-duty K-type Quinn unit, and is measured out automatically for the various sizes of pipe. After a section of pipe is molded on the revolving table and compacted by the automatic tampers, the core is pulled by a small electric hoist and

Portable conveyor under bin gate supplying material to mixer at pipe machine

Pony hopper and portable conveyor pushed aside to load truck



Delivery of materials to storage bin

the molded pipe is wheeled by a steel cart to the curing room.

Pipe is manufactured in sizes ranging from 12-in. to 60-in. diameter. Sizes of 18 in. and larger are reinforced with wire mesh.

On the curing room floor the pipe is cured by a jet system of water sprays, consisting of 2 in. pipe lengths running crosswise half the length of the building 8 ft. apart. There are 10 spray jets to each length of pipe and 18 lengths are employed in the spray system. This is regulated with valves so that sprays can be used together or separately to give fine spray or a coarser stream as needed. The concrete floor is made to slope to rear end of the plant and this allows the water to drain off readily. The pipe thus sprayed remains under the water cure for about five days, after which it is stored in the yard adjoining the plant.

For moving material from the storage bin into the plant after it is sorted and weighed, there is a portable conveyor under the bin, operating on wheels and track, which can be quickly shifted from underneath the weighing batcher and allow the loading of trucks for hauling of stone and sand. There is also a special pony hopper for charging the Paris transit mixers. This hopper travels on a short section of track and can be slipped into place readily for charging of transit mixers from the storage bins. A 1100-gal. water storage tank is installed between the storage bin and the warehouse portion of the plant, thus permitting the transit mixers to receive water simultaneously with the dry materials used.

Transit mixer being loaded through special pony hopper

The plant is completely electrically equipped, having individual motor drives with speed reducers for each machinery unit. Push button starters have been provided at each machine and all are interconnected in such a way that they may be automatically started or stopped in sequence. The gear reducing units are all enclosed, thus eliminating belts and pulleys. Current used is 3-phase, 60-cycle, 220-volt, obtained from the local power company. For welding of wire joints in making pipe reinforcing, the equipment includes a 220-ampere Taylor-Winfield spot welder.

The officers and directors of the Hughes Stone Co., Price Sand Co. and Oklahoma Cement Pipe Co. are: J. M. Chandler, president and general manager; T. R. Dean, vice-president; Claude W. Chandler, secretary and treasurer.

The officers and directors of the Builders Concrete Co. are: L. E. Kimberlin, president; J. M. Chandler, vice-president; Claude W. Chandler, secretary; J. T. Lynch, treasurer.

New Type Concrete Pipe

THE CONCRETE PIPE INDUSTRY, through Jack Collins of the Collins Pipe Co., Portland, Ore., has developed a perforated concrete pipe for drainage of roads and airplane landing fields. Some seven miles of this new drain tile 6 in. in diameter is now being laid in the center of the Old Oregon Trail between Haines and Baker, Ore. Tests on the airport show that this class of drainage tile when placed 9 in. underground will stand a pressure of 12 tons.

When the heavy Boeing transport planes land on a field there is a considerable weight and jar, and the old form of drainage tile did not stand the gaff, but in the Collins new departure it is believed the problem of thorough drainage has been solved.

Urge Concrete for Postoffice

URGING that he take immediate steps toward speeding the construction of the Salt Lake City, Utah, postoffice addition and veterans' hospital, the chamber of commerce sent a letter recently to Senator Reed Smoot, prior to his departure for Washington, D. C.

The chamber also sent to Senator Smoot's Washington office samples of cement blocks or cast stone, made in Salt Lake, with the suggestion that this type of material be considered for use in the postoffice building in preference to Indiana limestone.—*Salt Lake City* (Utah) *Tribune.*

Among Western Producers

By W. A. Scott

THE Oregon Portland Cement Co., Portland, has increased the cement-storage capacity of its plant at Lime, Ore., to 125,000 bbl., by the construction of four concrete silos, each 32 ft. diam. and 85 ft. high. Facilities for filling them were provided by extending the system of belts and spiral conveyors from the old to the new silos. This additional storage affords a reserve supply for meeting the demands for cement at the Owyhee dam job.

This company, whose limestone for its Oswego plant is shipped from its deposits, 10 miles from Roseburg, has supplanted open quarrying by mining methods, the latter consisting of running drifts from a main haulage tunnel and stoping the rock above that level. The limestone deposit there, which has a dip of 45 deg., is opened at the footwall by the haulage tunnel. The broken rock is hauled to the portal in mine cars, drawn by Jeffrey storage-battery locomotives. It is then delivered to shipping bins on the railroad over an 800-ft. gravity tramway. No crushing of limestone is done at this source of supply, the shipment of 7000 tons per month to the plant at Oswego consisting of mine-run rock.

Sand and Gravel Output of Portland District

The 1930 production of sand and gravel in the Portland district amounted to about 480,000 cu. yd., which is not more than 60% of the output for 1929. This yardage includes that produced by six companies operating dredges on the beds and bars of the Willamette and Columbia rivers; and the output of five other concerns that operate crushing and screening plants at gravel and sand pits in the vicinity of Portland.

About 20% of the year's production was used in city street and highway surfacing. The principal decrease corresponds to the falling off of building construction in Portland and vicinity.

Production of Crushed Rock

The crushed-rock production of the Columbia Contract Co., Portland, for 1930, amounted to 45,360 cu. yd., as against 51,440 yd. for 1929. The bulk of the 1930 output consisted of 1-in. rock and that running ¾-in. minus, required mostly in bituminous road and street paving. Only about 10% of the crushed product was above 2½-in. size.

The company's basalt rock quarry and crushing plant are on the Columbia river, at St. Helens, Ore., the product being barged to its dock and storage in Portland. In order to meet the demands for 1-in. rock and rock screenings, the company installed a year ago a Symons No. 3 cone crusher to supplement the work of the Symons 36-in. disc, which had been in use several years. The cone crusher takes in 3-in. to 1-in. screened rock from the primary crushers. The cone unit is driven from the main mill shaft through a 10-in. leather belt, running on 10-ft. centers. The entire plant is steam operated and is in charge of A. F. McIntire.

The rock quarry and crushing plant, owned and operated by the City Motor Trucking Co., Portland, had a production of 40,000 cu. yd. of material for 1930. This comprised 3-in. and 1-in. crushed rock and screenings, sold mostly to contractors on city and highway work. The plant is at Rocky Point, on the Columbia, and the product is delivered by barge to the company's dock in Portland. Porter W. Yett, manager, contemplates such improvements in 1931 as will effect greater economy in plant operations.

The Star Sand Co., Portland, in addition to producing sand and gravel from river deposits, operates a rock quarry and crushing plant on the right bank of the Columbia, at Mt. Coffin, Washington, five miles from Longview. Its crushed-rock output for 1930 comprised 7000 cu. yd. of screenings, graded from ¾-in. to dust; 20,000 yd. from 3-in. to ¾-in.; 10,000 yd. of riprap for jetty construction, running from 25 to 500 lb. The crushed rock is shipped by barge to the company's dock and storage bins on the Willamette river, in Portland. This production amounts to about 50% of the company's 1929 output.

The plant at Mt. Coffin consists of two Austin No. 7½ primary crushers; two Austin No. 5's for secondary crushing; and a Symons 36-in. disc for reduction. These units are all steam operated. At the quarry, which is 1000 ft. from the plant, a Bucyrus 70-C. steam shovel is used in loading broken rock into Western 6-yd. dump cars for haulage to the crusher bins. For other work, Mundy hoists are used.

The Star Sand Co.'s business is under the management of David Minsinger, Portland.

Lehigh Cement Reopens Washington State Plant

THE METALINE FALLS, Wash., plant of the Lehigh Portland Cement Co. was scheduled to start operations on or about December 1, according to Superintendent H. H. Helwig. The plant has been closed down since about the first of May.

Since the closing down of the plant installation of two air separators, which will increase the grinding capacity of the plant and at the same time produce a product of finer and improved quality, have been installed. The new additions required an extension of one of the buildings and the improvement cost approximately $50,000. During the shut down an effort was made to clean out all the old stock and what is manufactured from now on will be of the higher standard and finer grind.

About 60 men will be employed by the company, all of whom are local people, and it is hoped the plant will have a long, continuous run, which will depend, of course, on market conditions and ability to move the product. The policy of the company in operating at a time of the year when other employment is not available is a much appreciated one by the employes and starting up of the plant at this time is welcome news to the community, especially in view of the general employment situation all over the country.—*Metaline Falls* (Wash.) *News.*

Superior Cement Plant Closing a Busy Season

EDWIN P. LUCAS, president of the Superior Portland Cement, Inc., returning from the Portland Cement Association meeting at Chicago, Ill., is quoted by the *Seattle* (Wash.) *Post-Intelligencer* as follows:

"The Superior's plant at Concrete is running on a normal schedule and full-time operations are in prospect for the winter months." He said the plant was unique in that it has not had a complete shut down for nearly ten years, working continuously night and day through that period.

The Pacific Northwest is one of the bright spots on the cement shipment map of the country, Mr. Lucas said. The remainder of the country shows a 5% decrease in sales, while this locality registers a 15% increase. Sales in Washington to October 1 totaled 2,336,928 bbl., up 18%. This compares with a 4% drop in Oregon and 18% decline in California.

Regulations Covering Fire Protection of Wall and Partition Openings

REGULATIONS COVERING the protection of openings in walls and partitions against fire, as recommended by the National Fire Protection Association, have been published in a 100-page booklet by the National Board of Fire Underwriters, 85 John St., New York, N. Y.

This is a revision of the 1927 edition to cover new devices developed since that time, and to simplify and classify the regulations by eliminating structural specifications on doors and hardware labeled by the Underwriters' Laboratories, and by substituting wherever feasible performance requirements for construction details.

No fundamental changes have been made in the character of the protection specified. These regulations are effective October 15, 1930.

"Pineapples" Enter Chicago Sand and Gravel Industry

A HEAVY CHARGE of dynamite or nitroglycerin on the morning of November 30 wrecked the crew's quarters of the $400,000 barge of the Material Service Co., Chicago, Ill., plying between Chicago and Lockport, as it was opposite Summit in the canal, headed for its Chicago dock at 34th street and Racine avenue.

The captain of the barge and six others were injured by the blast, two probably fatally. Both federal and state authorities began an investigation of the outrage.

Capt. C. O. Brown of Port Huron, Mich., veteran lake sailor, who commanded the barge, was lacerated about the face and body and suffered a cut along his right arm. He owed his life to the fact that he left his cabin to go on deck a minute before the explosion occurred. The cabin was reduced to kindling wood.

The damage was estimated at $10,000 by Maj. Rufus W. Putnam, formerly United States army engineer in the Chicago district and now secretary-treasurer of the Leatham D. Smith & Putnam Navigation Co., owner of the boat.

"There is no question that the explosive was planted by some one seeking revenge, but I don't know by whom," said Maj. Putnam. "The barge carries sand and gravel. We are in competition with no one and I cannot imagine any trade motives behind it. We have at various times discharged members of the crew. It might have been one of those men."

Lieut. Mike Mills, bomb expert, of the Chicago Police Department, declared that the bomb was made of nitroglycerin. He expressed the opinion that the charge had been placed on a movable part of machinery near the steering gear and discharged by motion of the machinery after the barge was five hours out of Lockport. No traces of timing apparatus were found and "Lieut." Mills expressed strong doubt that the bomb had been thrown, because of the risk that the thrower would take.

These findings were reported to Alexander Jamie, chief investigator for the "Secret Six" crime fighting committee of the Chicago Association of Commerce. Demand for investigation by the association was made by Maj. Putnam.—*Chicago* (Ill.) *Tribune.*

Tennessee Gravel Plant Works Overtime

THE Memphis Stone and Gravel Co. at its plant 1½ miles east of Camden, Tenn., has installed new and modern machinery. During the summer months it was not able to take care of orders, having to run night and day.

This enabled them to load 75 cars of gravel in 10-hour shifts.—*Nashville* (Tenn.) *Tennessean.*

South Bend, Ind., Gravel Companies Merge

MERGER of one Mishawaka and three South Bend, Ind., gravel and sand companies into South Bend Sand and Gravel Co. was announced recently by H. G. Christman, head of the H. G. Christman Co., contractors, and one of the organizers of the merger. Articles of incorporation for the new concern with a capitalization of $500,000 have been filed with the secretary of state at Indianapolis and 50,000 shares of stock at no par value will be issued.

The merger involves the George J. Hoffman Sand and Gravel Co., the Mid-West and the H. G. Christman Sand and Gravel companies of South Bend, and the Beyrer Bros. Sand and Gravel Co. of Mishawaka.

Owners of each of the concerns will receive a proportionate amount of the shares in the South Bend Sand and Gravel Co. as payment for their respective holdings.

Directors of the South Bend company, which will supply chiefly the local demand and which will form one of the largest organizations of its kind in the Middle West, are:

George J. Hoffman, Herbert H. Hoff, W. H. Edwards, C. R. Moore, J. Lloyd Beyrer, James R. Beyrer, J. B. Christman and J. Fred Christman. Officers will be elected at a future meeting. Temporary offices will be located at the present offices of the Hoffman company at 3113 Lincoln Way West.

Extensive improvements in the gravel pits to better the facilities and service are planned by the new group, Mr. Christman said in making the announcement.

The Hoffman pit, in operation here since 1914, is located at Lincoln Way West and Nancy street near the city limits; the Mid-West company, founded in 1923, on Liberty highway, southwest of the city, and the H. G. Christman pit, exploited since 1923, on Wilson road west of the city. The Beyrer pit, in operation for one year, is on the southeast side of Mishawaka.—*South Bend* (Ind.) *Tribune.*

Ohio River Sand and Gravel Operators Expand Fleet

FIFTEEN BARGES have been purchased by river concerns and will be pressed into service in the sand and gravel transportation service on the Ohio river. The Pittsburgh Gravel Co. of Baden purchased a fleet of 10 steel barges and the McLain Sand Co. of New Martinsville, W. Va., a fleet of four. These barges, which formerly were used in the coal-carrying trade on the Monongahela river, are each 100 ft. long, 26 ft. wide, 8 ft. deep and have a capacity of 400 tons each. The Dravo Contracting Co. of Pittsburgh has sold to the Suiter Material and Transportation Co. of Manchester, Ohio, a standard steel sand and gravel barge of the 100-ft. type.—*East Liverpool* (Ohio) *Review.*

New Jersey Sand Producer Shipping Marl Byproduct

MARL SOIL today is in big demand, and an unusually large shipment, consisting of 45 tons was made recently from a farm near Hurffville, N. J. This shipment was made by the Inver-Sand Co., which is now operating the development.

Marl soil was used by farmers years ago as a fertilizer, but today there is practically no call for it in that capacity. It has been found quite a help in softening water and is now being used extensively by laundries.

The West Jersey Marl Co. held big holdings near Hurffville in what were termed the "marl pits." Just below Sewell the West Jersey and Seashore railroad ran a spur, crossing what is now the Edwin Wyckoff farm, the Sewell-Knight Run and the Woodbury-Glassboro roads, into the pits. These pits have not been used for a long time and the spur has been taken out. Nothing is left but a deep ravine.

With the development of foreign trade for marl, the Inver-Sand Co. first tried to use marl from the old pits, but chose a different grade from the east side of the creek, purchasing the A. C. Heritage farm upon which they erected a plant.

At this point the marl, "green sand," is probably close to 277 ft. thick after the topsoil is removed. It is supposed to be composed of organic remains of fresh water mussel, fresh water shell, trunks and branches of trees which in one place were 25 ft. thick, and a stratum of 4 ft. of clay-like sand containing leaf impressions.

This deposit is claimed to have been formed during the glacial age when all the lower part of New Jersey was covered by water. As the waters receded and with the change in direction of the Gulf stream, this deposit of clay marl was left in a narrow strip. When clay marls are exposed they show a crust of reddish material. Below the surface it is a dark colored clay mixed with grains of green sand. The soil is more or less sandy and remarkably free from stones and boulders.

As the clay marl is dug out it is dropped in a small lake-like affair of fresh water. A suction pump is placed at the end of an 8-in. pipe and the marl is sucked through the pipe to 12-ft. vats where it is refined, drained of water and placed in bags.

The Inver-Sand Co. has already made shipments to Canada and to most parts of the United States.—*Pitman* (N. J.) *Leader.*

Michigan Gravel Producer Lands Big Contract

IF A LOCAL NEWSPAPER didn't get some decimal points in the wrong place the Hersey Gravel Co. has received a $742,770 contract to improve 11,227 miles of highway within Van Buren county to join present highway south of South Haven, Mich., city limits.

Repair Shop Operations for Heavy Duty Rock Products Equipment

By Orville Adams
Dallas, Tex.

EXPERIENCE AND STUDY of repair and maintenance problems of heavy duty rock products equipment—particularly in the case of major breakdowns, and repairs resulting from wrecks, failures and accidents to larger castings and forgings, the reclaiming of which is highly desirable and important—is a matter of widespread interest to operators of a large number of plants. A great many plants maintain their own machine shops and repair facilities, but much of the important repair work to the large members is beyond the facilities and experience of the plant's shop. The question then arises of having the repair work done in some outside shop, or buying a new part. The operator who knows and plans and anticipates is the one who operates with the greatest possible economy.

The smaller local machine shops found throughout the country, evolving for the most part from the former blacksmith shop, are equipped for work little beyond the general light class of repairs such as incident to the automotive demands. But there are developing over the country shops which specialize in large scale repair and maintenance work.

Shops which do only light repair work are rapidly passing out of the picture, since the standardization of parts renders competition with the manufacturers out of the question. In the field of smaller parts, for many rock products machines, the lathe, the welding apparatus and repair shop machines, despite the present day advancement, cannot compete with the automatic machines used in the manufacture of parts. Practically speaking, there is little use, except in emergencies, for facilities for repair work, where the replacement of broken parts by new ones is more economical.

Beyond a certain limit there is, however, ample opportunity for money saving expedients involved in the repair and reclaiming of the larger castings, forgings and the major machine parts that fail in accidents, or as a result of improper application. It is to those instances that we wish to draw attention.

Advancement in Rock Products Equipment

There is evidence on every hand that present machinery and equipment used in the rock products industries are being built with the object of reducing to a minimum such failures and breakdowns as require major repairs or replacements. Alloy steels have demonstrated their superiority over plain steels, alloy castings over plain gray iron, etc. It is amazing how much better equipment is being built now than was available a few years ago—not only greater strength to resist impact, wear and strains, but it is more carefully designed to suit the most exacting conditions met with in service. Common failures of a few years ago are remembered now as problems whose solution was made permanent by better design and construction.

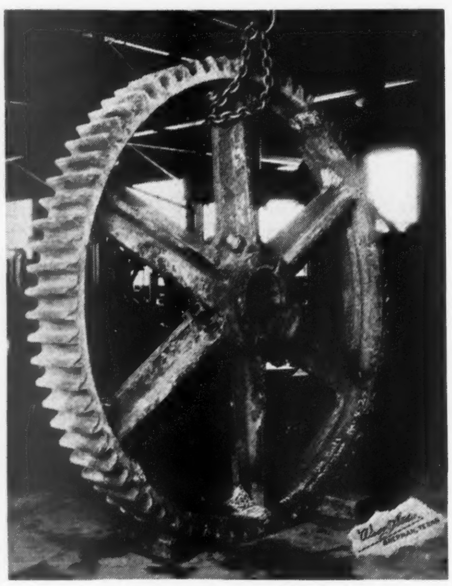


Fig. 1. This gear was broken in an accident into several pieces and successfully welded

Metallurgical Advancement

Production delays of the present time rule out all but the best constructed equipment. Plant operators find the most modern machinery the best assurance of low operating cost. Yet the most urgent demand is for greater output per unit of equipment, meaning higher speeds and harder service. While the necessity for increasing the life of machines and parts is everywhere appreciated, the demand for capacity operation over long periods of time sets up strains in the equipment that result in distortion and fatigue, taking a yearly toll of heavy parts. Therefore, a consideration of economical means for repair and maintenance is in order.

Need for Repair Service

There is obviously a need for adequate repair facilities, methods, shop equipment and experience with larger repair work, which should be made available to the industry. It is the purpose of this article to discuss several important repair operations, the methods and tools, with brief mention of some shops, and experiences that have proven economical to users of heavy equipment.

Advancement in the art of welding, the perfection of machines and methods for repair of shafts, castings and the like worked out here and there in the field, demonstrate the importance and economy of these methods in many instances.

Existing Service and Facilities

There are available throughout the country several large shops having equipment and experience with larger repair work. For the most part many of these shops have not made themselves known beyond their own immediate fields of operation, while one or two others reach wide areas through reputation and advertising. Coming under the writer's observation are striking illustrations of the distinct value of such services as these shops render the user of heavy equipment.

There are also here and there numerous operators who have encountered and successfully handled major repairs in their own shops by the use of the welding machine and repair methods. A collection of some of these instances would prove very interesting and helpful. Experts in welding, and machinists, have traveled to the job and repaired large crushers and other plant equipment with facilities provided by the plant's own shop.

Equipment is now being manufactured and used in connection with such repair service for the individual plant shop as well as the commercial shops which is inexpensive and useful to such an extent that the cost of repair and maintenance may be reduced by a very considerable extent for many types of accidents and failures.

Therefore we may analyze this problem from a number of angles in a comprehensive manner. A survey of the situation leads us to some conclusions:

1. No large shaft, casting or forging should be abandoned until it is determined that the part in question can be replaced new at less cost—and even then any delay in receiving the new part over time lost in replacing the old must be considered.

2. Repair methods can reclaim castings of practically any size and complicated structure by welding methods that render the part as strong and reliable as a new one.

Fig. 2. In this case a patch was cast and welded into the broken frame, minimizing labor in assembling small pieces and in machining and finishing

3. The part can frequently be repaired and put back into service in less time that is required for the purchase and shipment for new parts, provided such parts are large base parts, large shafts, special gears, etc., that cost a large percentage of the original machine.

4. Such repair work may be done on the ground without shipment of the broken parts to the shop, which saves time and transportation cost and sometimes the expense of completely dismantling the machine.

Most repair work of this kind is charged for on the time and material basis, hence the cost for many operations have long since been determined in shops having the experience. Rates for the various separate operations in the average shop range from $1.50 to $2.50 per hour for machine and man, or operation.

Comparison in Other Industries

In industries having large unit operation, but scattered over vast areas, are the oil producing and pipe-line pumping companies. Obviously these operations involve the operative experience of many men and a great number of prime movers, pumps, motors and auxiliary equipment, similar in size and cost to the rock products equipment.

These industries in the Southwest, where they are most numerous, have developed within their own organization large repair shops, such as are maintained by railroads, for repair and maintenance of equipment. These shops are similar in many respects to the shops and repair departments of the large cement mills, quarrying operations, etc. Some of our experience may be drawn from these shops, as well as the commercial shops serving the general industries, including rock products.

Classes of Repairs

There are many large machines in the rock products field subject to accidents and breakdowns, hence the necessity for speedy and adequate repair service. Among the most important to which welding and machine shop operations are applicable are: Frames and parts of locomotives, shafts and forgings, locomotive cranes, gas engines, steam engines, Diesel engines, air compressors, crushers, mills, well-drill rigs, conveyors, steel structures and the like.

The direct repair operations include bronze welding, casting and cast welding, electric arc welding, forging, shrinking on, lathe work, radial drill work, reaming, boring, grinding, blacksmith work and other details; and castings of gray iron and steel.

Among the important casting repairs are the base and bed plates for motors, engines and crushers, mills and compressors; cylinders, cylinder heads, pistons, crankcases, for air compressors, steam engines, gas and Diesel engines and locomotives. Practically any piece on any of these machines is subject to economical reclamation by proper machine-shop and welding operations.

Broken shafts resulting from fatigue, vibration, wrecks and long continued operation with misalignment and overload are reclaimed by being "built up" with separate forgings, shrunk on to the shaft to replace broken webs, crankpins and journals. Largest shafts have been repaired and restored to the underwriters' requirements for reinsurance at a fraction of the original cost of such shafts.

Refinishing crankpins and journals that have worn down, by returning and polishing, bearing rebuilding, as well as boring and regrinding liners and cylinders for engines,

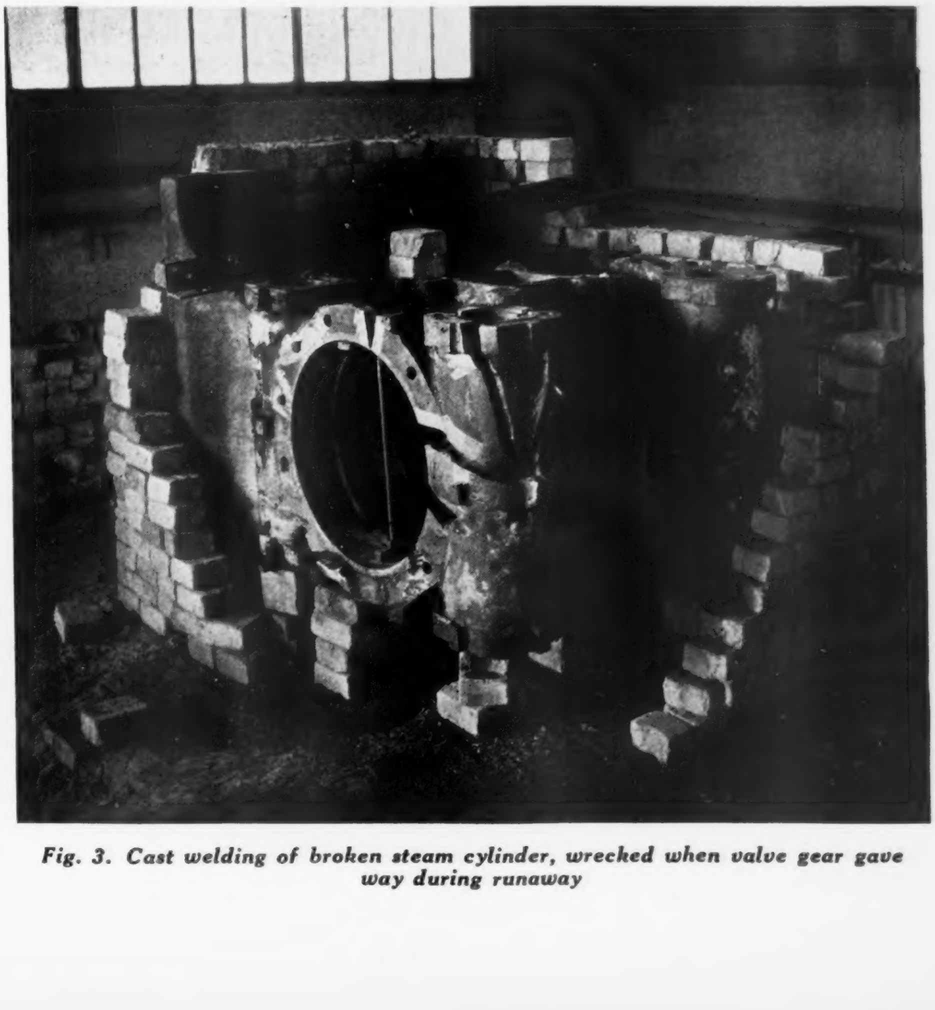


Fig. 3. Cast welding of broken steam cylinder, wrecked when valve gear gave way during runaway

compressors, and hydraulic cylinders are a class of repair work both economical and feasible.

Bronze Welding Operations

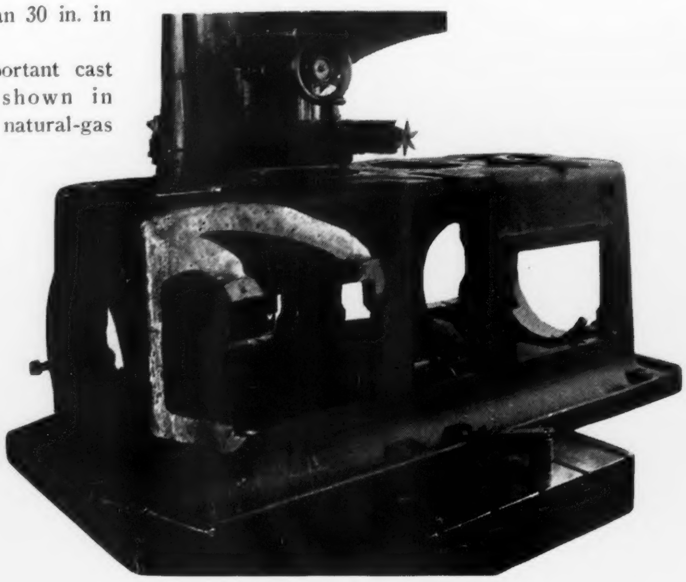
Bronze welding is applied to the repair of large castings such as cogs, gears and pulleys, motor frames and bed-plates. This is equally true of many other castings having simple design, without complicated internal structures that require preheating and annealing. Fig. 1 shows a very large gear broken in an accident to several pieces which was successfully welded. The cost of the repair was but a small part of the cost of such a gear new, and the time saved would have paid for two or three such gears new.

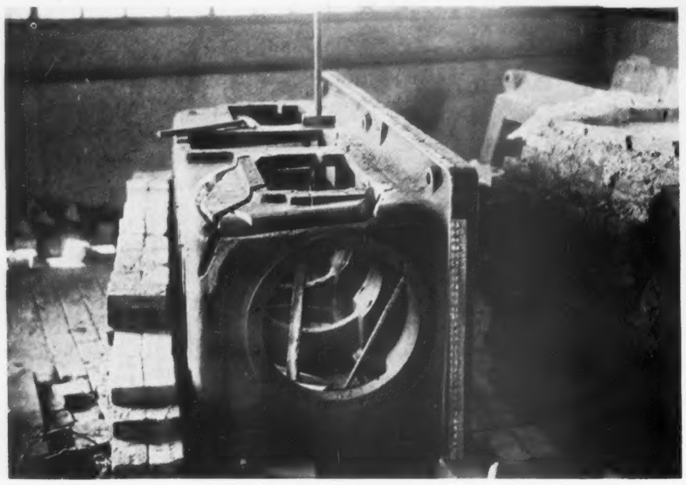
Generator and motor base plates, Fig. 2, may be reclaimed by bronze welding. In this particular case, instead of welding together numerous small pieces, a patch was cast and welded into the broken frame instead of assembling the pieces—a tedious work. Machining and finishing work was likewise reduced, so that the cost of the repair totally reclaimed was less, the cast patch weighing 300 lb., while the entire plate weighed 4200 lb.

Cast Welding Operations

Cast welding of complicated parts, such as cylinders and cylinder heads, Fig. 3, requires accurate technique in welding, preheating and the construction of a suitable preheating furnace, several days of cooling and annealing as well as experience in machining and handling such repair-shop jobs. Repaired parts cost from \$400 to \$500, even though they have as many fractures as the steam cylinder shown, while the cost new would have been thousands of dollars for an engine this size, more than 30 in. in diameter.

Another equally important cast welding operation is shown in Fig. 4. This 225-hp., natural-gas engine bed-plate served an important gravel plant operation and was fractured in an accident. The cost of such bed-plates and bases are about one-fourth to one-third the cost of the engine as a whole. Hence this bed-plate represents several thousand dollars. The weld, including the cost of dismantling the engine, shipping the part to the shop, return and assembly of the engine, was less than \$500. The work was completed in less time than required for delivery of the part new, since the factory did not have such a part in stock at the time of the accident. The loan of a base from an idle engine in the vicinity while the broken one was being repaired enabled the engine to operate within 24 hours after the breakdown, and when the part was finished the dismantling and reassembly required but one night. A view of the weld is shown in Fig. 5.





Figs. 4 and 5. Start of welding job on a natural-gas engine bed-plate, fractured in an accident, and the finished weld, above

Fig. 6 shows a bed-plate of a 360-hp. oil engine. As is well known, but sometimes disregarded and neglected, the crankcase scavenging engine draws the air through the crankcase, which acts as a pump. Such crankcases must be kept drained of lubricating oil, and if the drain is allowed to stop up, and the lubricating oil accumulates, up to a certain level, the crankcase churns the oil into a fog or mist. It is then taken in with the intake air and burns, causing the engine to run away, since the governor has no control of the intake air.

In this case, as the engine speeded up, a counterweight came loose from the crankshaft, fell into the crankpit and locked the revolving shaft and connecting rod. The result was a wreck that broke the base almost entirely through the bottom. Welding reclaimed this large part and saved several thousand dollars. The writer has seen many large parts like this repaired by welding and permanently restored at a small cost compared with the cost of the casting new.

Some of the misfortunes that can overtake heavy machinery are shown in Fig. 7, where the connecting rod bolts are supposed to have come loose on this 1200-hp. engine. As this happened with the engine running under load, the piston was quickly thrown through the side of the crankcase of the engine. Fortunately the only serious damage was to the frame work, which was repaired by welding without dismantling the engine, a new connecting rod and piston being necessary, as well as the refinishing of the damaged crankpin.

These large blisters and burrs on the crankpin made it necessary to remove 0.055 in. with the portable crankpin turning machine shown in Fig. 10,

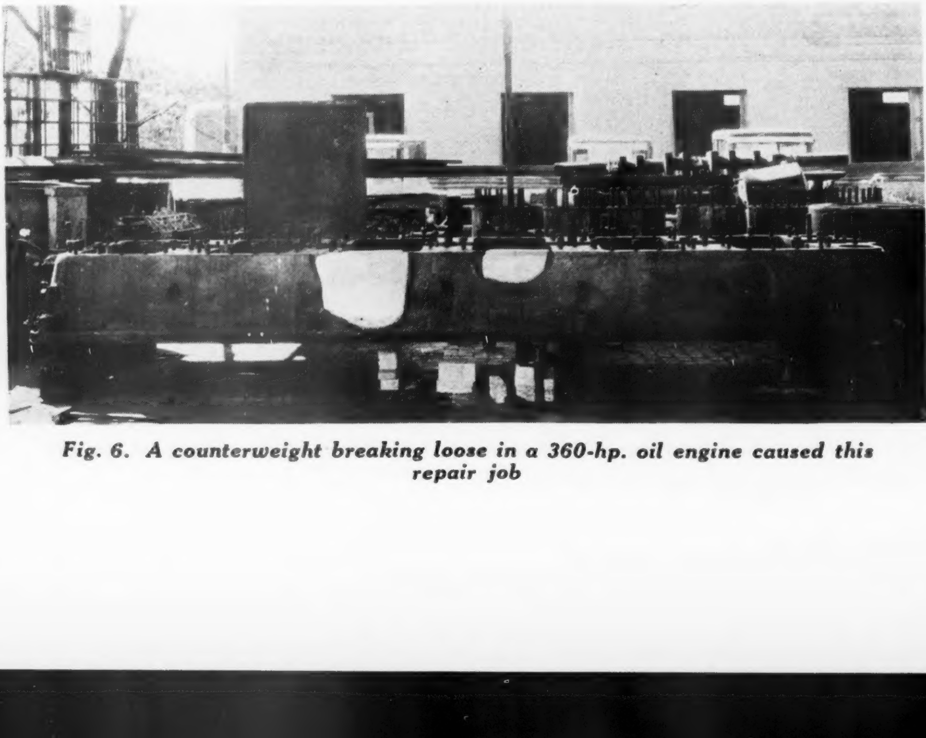


Fig. 6. A counterweight breaking loose in a 360-hp. oil engine caused this repair job

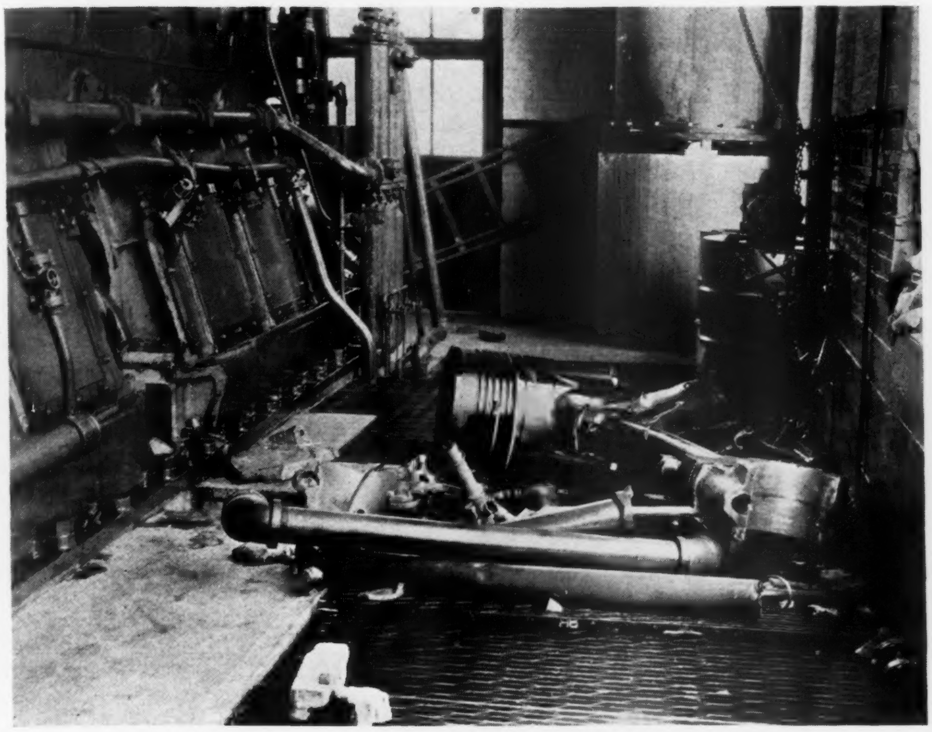


Fig. 7. A piston thrown through the side of this 1200-hp. engine. Serious damage to the framework was repaired by welding without dismantling the engine. See also Figs. 8, 9 and 10

which smoothed up the crankpin shown in Figs. 7, 8 and 9. The crankshaft was not removed from the engine, the crankpin turning machine being attached to the shaft as shown.

An equally important class of repair work is shown in Fig. 11, of a large pump, the impeller of which came loose on the shaft, causing wear of from 1/16 to 1 in. on the seal ring. The first operation consisted of milling down the worn surface, casting and shrinking on a steel band, reinforced with bronze rivets, and the machining of the outer surface of the seal ring.

Heavy duty equipment, comprising locomotives, steam and oil engines, large units in quarry, gravel pit and crushing plant, may be completely rebuilt and overhauled after major accidents make it necessary to dismantle the machine. As shown in Fig. 12, an A-frame of a large engine operating in a Texas cement plant is being machined after a weld, employing in this operation a horizontal boring machine instead of lathe or a vertical milling or drilling machine. The damage occurred when the crankshaft broke, due to low bearings and neglect. Such fractures sometimes occur in wrecks, but more frequently as a result of neglect in operation and repair.

Repairing such shafts involves truing up and returning crankpins and journals that have been scored or worn down out of true. A machine as mentioned previously, shown in Fig. 10, is used for this purpose. The machine can be used either in the shop or on the job without dismantling the engine. This special crankpin turning machine was developed by the Washington Iron Works shop, Sherman, Tex., for field repairs. It comes apart in halves, goes around the shaft and is adjusted to size. It revolves on ball bearings and employs a fine cutting tool that makes a smooth finish. The machine is motor-driven through a belt and spiral gear, the motor being a conventional portable tool motor.

Just a few years ago crankshafts were discarded upon being fractured and new

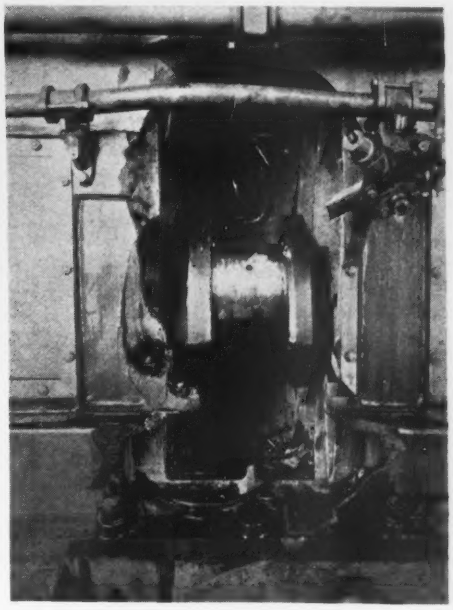
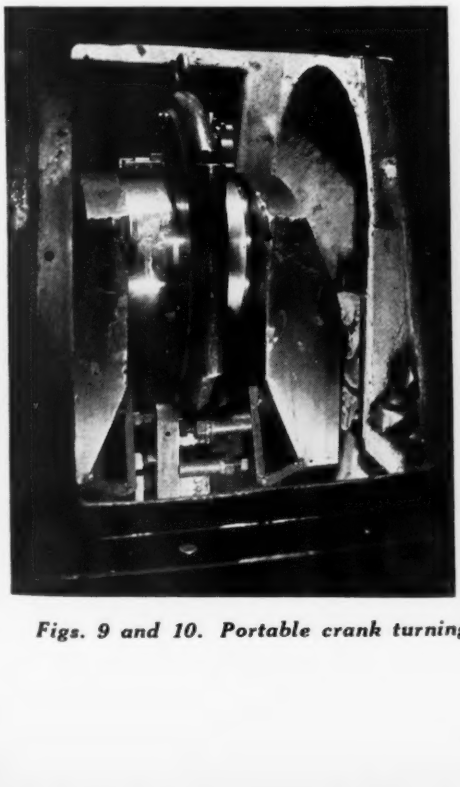


Fig. 8. Closeup view of damage caused to framework of engine shown in Fig. 7

ones purchased, the cost being approximately one-fourth to one-half the cost of the engine new. Many shafts 8 to 14 in. in diameter for engines ranging from 400- to 750-hp. that cost from $4000 to $5000, were junked. The early attempts to weld these shafts by ordinary methods were not successful, while Thermit welding was a process that proved too difficult for the ordinary plant and not sufficiently reliable.

In one shop where more than a hundred such shafts are welded annually the "building up" method has been worked out that insures shaft repairs that are reliable and as good as new, the repair work of such shafts costing but a fraction of the cost new. Such repaired shafts also meet all the requirements of



Figs. 9 and 10. Portable crank turning machine which smoothed up the shaft shown in Fig. 8 without removal

the underwriters, as they are reinsurable on the basis of a new shaft, although straight welded shafts are not so insurable.

The method of repairing these shafts is clearly shown in Fig. 14. If the crankpin is fractured on a solid forged shaft, the entire crankpin section is cut away and the web bored out to receive a new forging, which is made the size of the original crankpin and shrunk on to the web, the electric arc being used to build up a keyway to the original steel as shown.

This shaft has been in this shop two or three times, and it will be noted that the journal is twisted as well as the crank in the webs or throws, at the right of the view. To repair this shaft the center section of the journal that is broken as well as the other web will be replaced by new forgings, which makes the shaft a completely built-up shaft, it once having been a solid forged, single-piece shaft. Shafts originally solid forged are gradually built up piece by piece until the entire shaft except the journals and crankpins have been replaced.

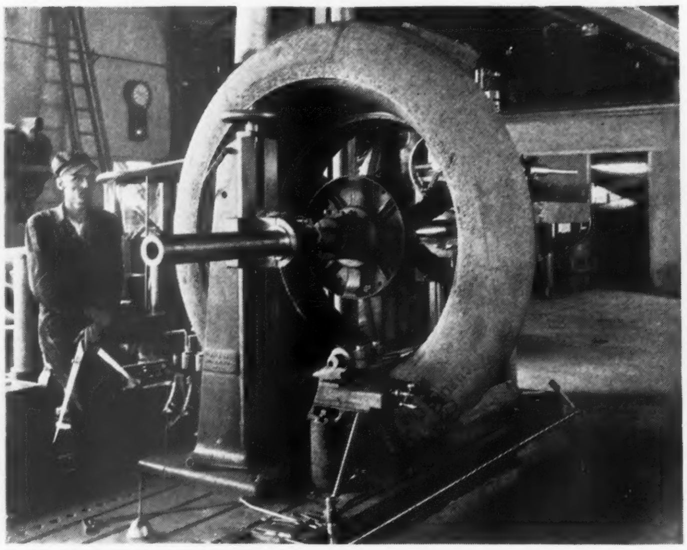


Fig. 11. Repairing seal ring damaged when impeller of large pump came loose

Sometimes the throws of the original shaft are built up with the electric arc. To make this clear, Fig. 15 shows how a shaft suffered a recent fracture of the left throw, which was replaced with a new forging; consequently it had to be shrunk on to the left crankpin and the journal. Frequently the original throw is not large enough, so that it must be filled on with the electric arc to give sufficient strength to the metal to withstand the enormous tensile strain of the shrinking-on process. As also shown, the old counterweight was machined and cut out to receive the new larger forging. Consequently all built-up shafts have larger throws than the solid forged shafts, and solid forged shafts have to have such webs or throws built up when a journal or crankpin is shrunk on to them.

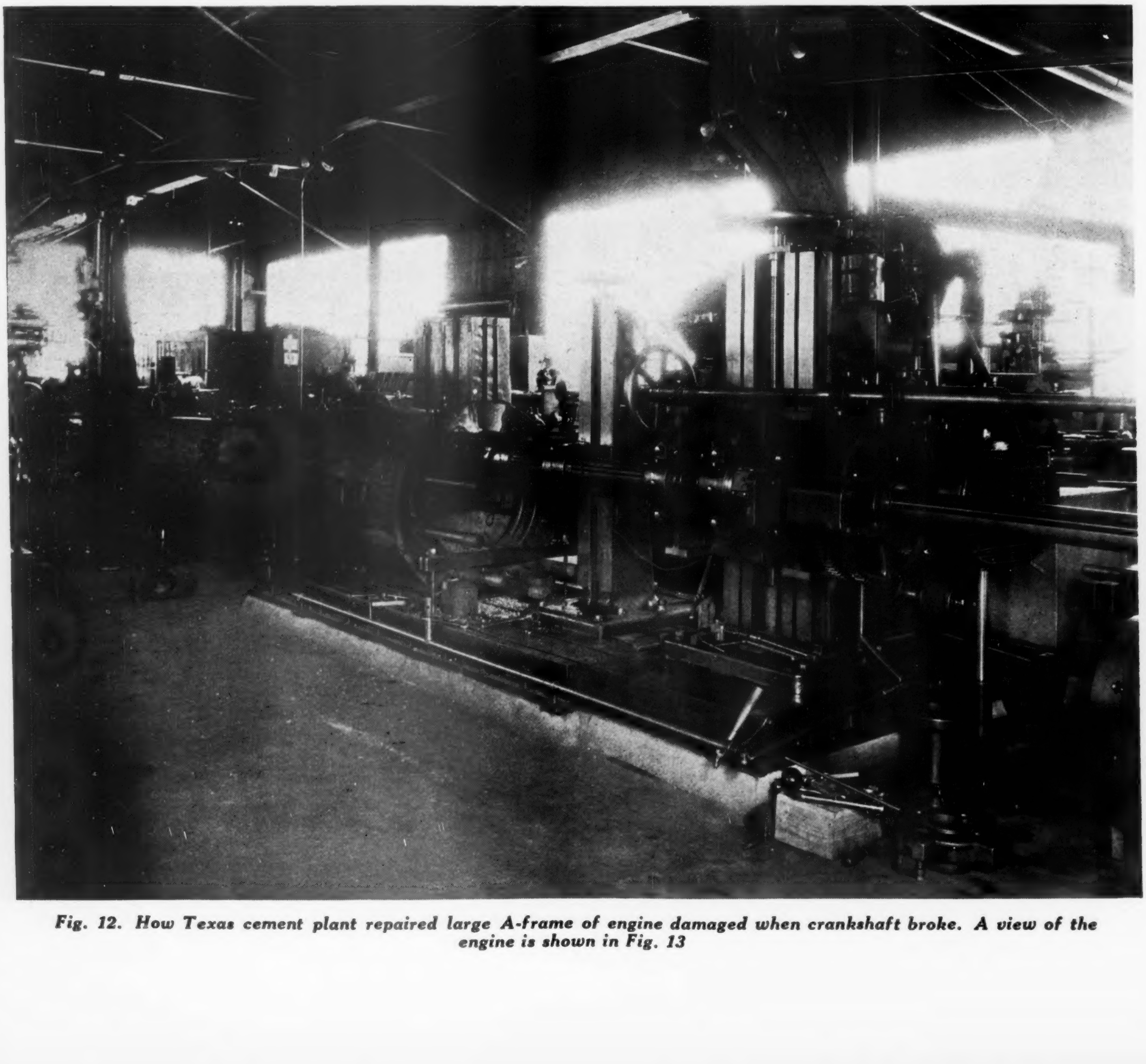


Fig. 12. How Texas cement plant repaired large A-frame of engine damaged when crankshaft broke. A view of the engine is shown in Fig. 13

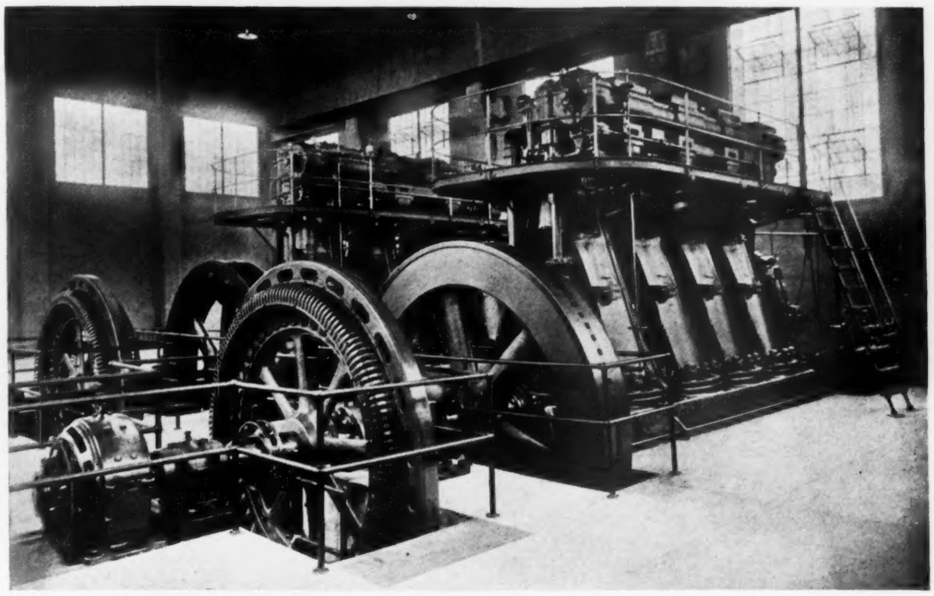


Fig. 13. Fifteen-year-old engine in which crankshaft and A-frame were repaired by an expert welding job as shown in Fig. 12

Skillful work with the electric arc and accurate, careful workmanship are essential on the various forgings repaired in this manner in order that the assembled sections will be true and straight, as well as tight to the limit of the tensile strength of all "shrink" fits. Cutting keyways on large shafts that are short and deep proves difficult without proper study of the operation and adequate equipment. Fig. 16 is a view of an open-side Cincinnati shaper cutting a keyway in a large shaft which has been repaired. Work on these shafts with the arc and for the shrinking-on process involves the use of gas heat to bring it up to the proper temperature for shrinking on. Very careful heating is necessary for this operation.

It should be noted that a great number of these operations described were made in a large shop specializing in heavy repair work, where nearly all operations have been reduced to accurate and carefully standardized procedures.

Welding in Rock Products Industries

There are many involved problems in welding heavy parts, particularly the large complicated castings which may have internal cracks due to the casting process as well as fractures.

Therefore heat control is very important in order to avoid warping, although any preheated and annealed casting when welded will warp to some extent, involving machining in most cases before it can be put back in service. Additional cracks may be set up during the welding due to internal stresses of welding heats, unless a strictly good procedure is followed in welding. Such castings as cylinder heads, and some bed-plates and frames have various cavities, thin parts and recesses that may cause a number of warps or cracks.

Inasmuch as the heat possesses a tendency to flow from the hottest to the coldest part with a rapidity that is amazing, it is necessary to equalize the preheating temperature all over the casting, which can be done only by careful construction of a preheating furnace. As shown in the pictures holes are left through which welding is done after the preheat is up to proper temperature.

These holes are sealed up as soon as the welding is finished in order to avoid too rapid cooling and the loss of heat. Frequently asbestos is used for lining the furnace and to prevent the entrance of drafts and air currents and to prevent further loss of heat after the gas is cut off. Such insulation contributes also to the comfort of the welding operator, who may have to work several hours in a bending position, holding his blowpipe in a very close position for accurate, thorough work.

Oil and charcoal may be used for preheating, aided with proper compressed air or blowing fans; however, natural gas whenever available, without the use of fans, proves adequate for bringing these castings up to the proper preheat.

Some means of handling the castings, such as a portable crane, is necessary, for many times the casting must be moved around in the preheating furnace in order to get to all of the fractures. The top of the furnace is usually left open and covered with sheet asbestos and a sheet metal cover so this can be removed for handling and turning the casting.

Such covers must not be left off the furnace longer than necessary; it should be covered tight as soon as the welding is finished. The reason for this is that the path of heat as it flows through the metal depends on the shape of the metal and the direction of the air current striking it as well.

The homogeneity of the metal, the area and rate at which the welding heat is applied are also dependent upon the heat condition. Great care should be given in connection with the welding heat that is around 6500 deg. F. Cooling is also important, if a good annealing is to be realized.

If this is not observed there may be unbalanced conditions which permit rapid expansion of the metal and contractions across the thin parts in the vicinity of the weld, which will result in deformations, warps and eventually internal cracks, especially from stresses due to unequal cooling.

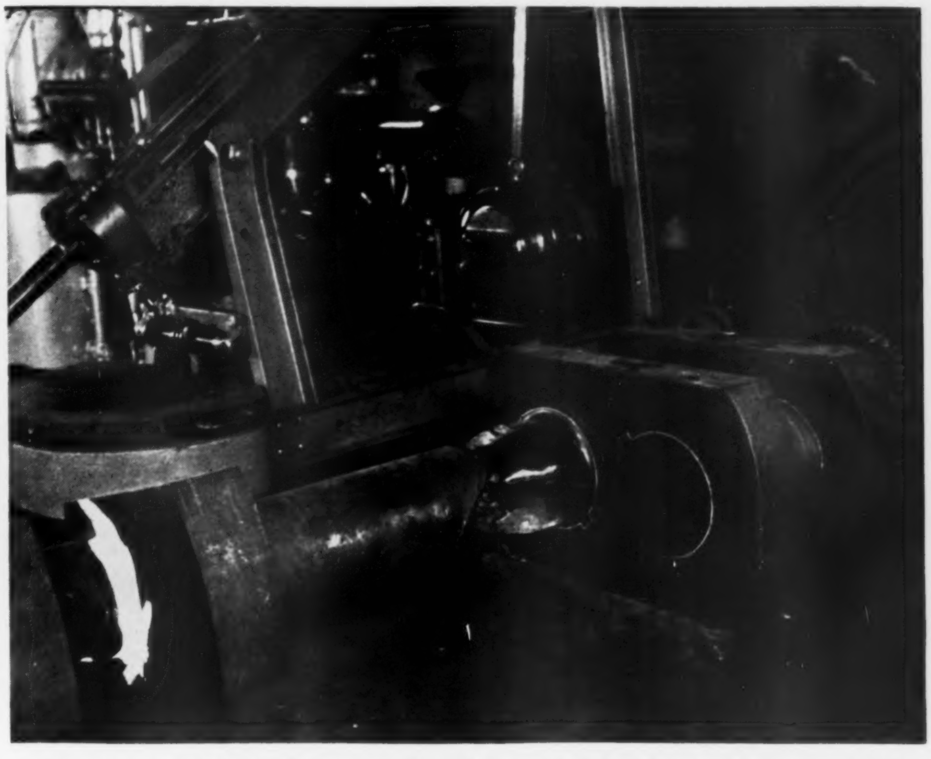


Fig. 14. Crankshafts formerly discarded upon being fractured are repaired through welding process which saves many thousands of dollars

Unequal heat stresses are also due to concentrated heat routes usually during the welding process, which cause rapid heat surges that alter the alignment of the casting. Obviously this permits breakage to occur, or warps, that entail an unnecessary amount of machining and finishing.

This can be avoided to a great extent by controlling the duration and direction of the flame, guarding the entire mass from drafts and air currents, preventing too intense heat and flame concentration while welding. It is also equally necessary that the preheating progress evenly and thoroughly, saturating the entire casting and furnace walls in such a way as to prevent radiation, which is accomplished by careful lining of the furnace with asbestos and keeping the working holes closed.

Preheating should not be done too rapidly, but the heat should be brought up slowly and not higher than a good red heat. This is approximately 1100 to 1200 deg. F. For most large castings this will require about 36 hours when using natural gas and as much as 48 hours with charcoal or oil-fired heat.

It should be kept in mind that many warps result from conditions inherent in the original casting which were originally caused by unequal heat radiation and cooling when in the foundry molds. The preheating and welding have relieved these internal stresses which are left in the casting by the slow cooling and annealing.

Since they will remain fixed the casting is said to be warped, but it is really relieved of these overstressed strains. Machining is then necessary to restore the shape and alignment, particularly with complicated air-compressor, engine, and like parts, such as cylinders, heads and bed-plates.

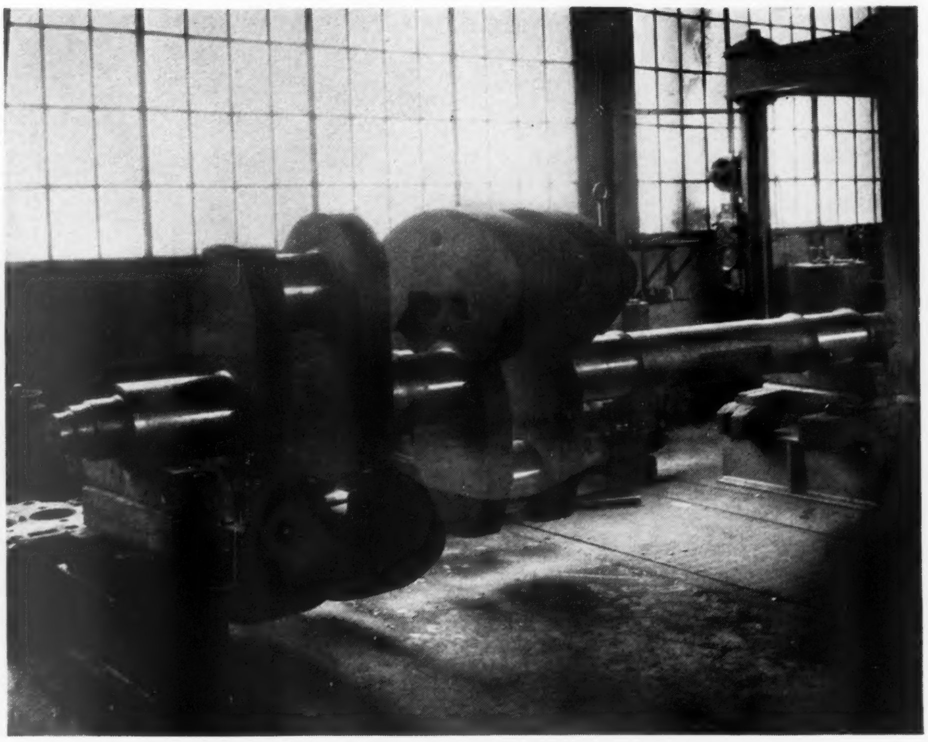


Fig. 15. Replacing fractured throw of a shaft is done with the aid of electric arc welding

While most castings for heavy machinery are supposed to have been seasoned for several months in the weather before the machine was built, no amount of seasoning relieves them of the casting strains due to uneven cooling when in the foundry molds.

It is this condition that results in cracks in cylinder heads which occur very slowly and over considerable periods after the machine is in operation, eventually causing them to fail for no apparent reason. Particularly gas- and oil-engine heads, which are exposed to intense heat on one side and to cooling water on the other suffer from these results of local stresses in the metal, which exceed the strength of the metal, causing cracks around openings and cavities; such crackings develop very slowly and frequently are ascribed to cooling water, but actually are due to original foundry stresses.

Such castings after proper preheating and annealing are said to be better than the original, due to this relief of the internal stresses. Correct preheating, careful welding and proper cooling and annealing will always relieve castings of these stresses, thereby rendering them in this respect better than before.

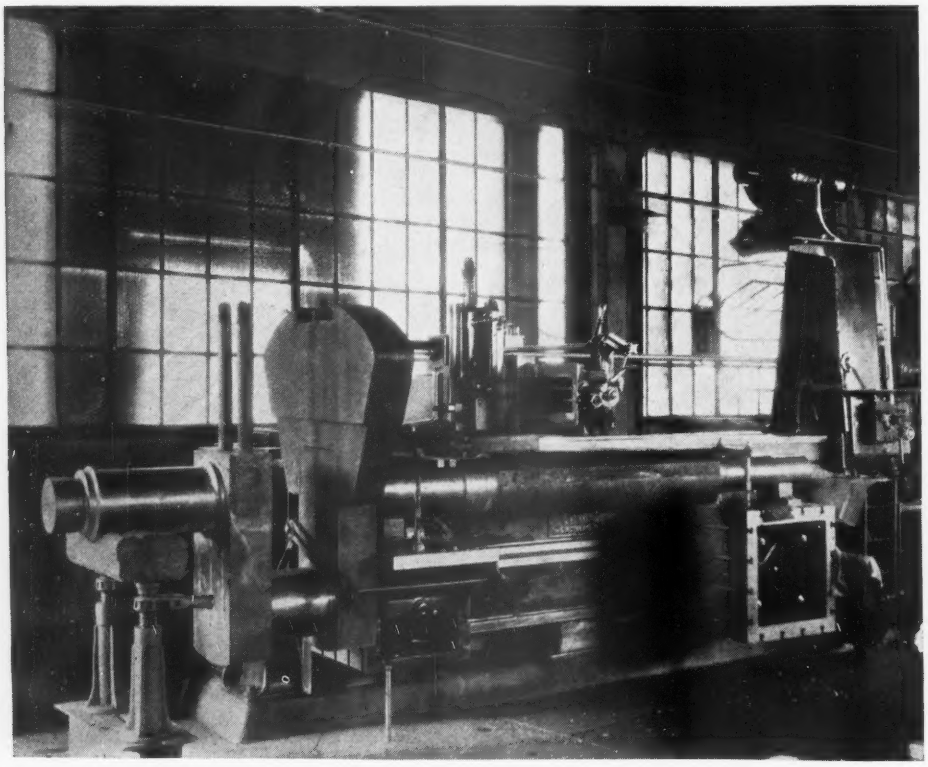


Fig. 16. Shaper cutting keyway in a large shaft which had been repaired

Welding Equipment

The necessary equipment for handling many large jobs in welding castings is indeed quite simple. In addition to shop facilities for machining, preheating and the like, welding equipment comprises oxygen tanks, acetylene tanks, a welding blowpipe and regulators for both oxygen and acetylene tanks, sufficient variety of welding rods, flux and goggles and gloves for the welder, friction lighters and some small parts.

The most important requirement in welding these parts is the use of a welding rod that will be soft and that machines easily, as well as facilitates handling the work. The essential preparation is to vee the edges of the weld to an included angle of 90 deg. A good welding rod and proper flux, cleaning and preparing the metal, careful handling of

the welding torch and working of the welding rod into the weld evenly and at a given rate, so that the weld metal, if properly applied, will contain no blow holes, entrapped gases, slags and other impurities, will insure good results.

In finishing up the weld the surfaces should be built up slightly above the original metal so that it will clean up in machining and can be neatly finished with the original face of the casting.

An experienced operator never allows his metal to get out of control when penetrating the bottom of the vee, as this results in widening the vee. He draws his flame away as the running metal tends to flow freely toward the bottom, or flow away too rapidly.

Observing the welder, he seems to hold his welding rod so that the tip is just in contact with the molten metal as it is carried along the vee. A skillful circular motion with the blow pipe guides the flow of the metal into place, precisely and accurately, allowing only a small part of the metal to melt off at one time as the rod is held just beneath the surface of the molten metal and flowing pool, as it fuses with the edge of the melted casting in such a manner that a completely homogeneous mass in the weld is produced without causing bubbles and gritty spots.

Bronze Welding

Cast-iron welding is complicated and can be avoided in many instances. Preheating and annealing is not necessary with bronze welding.

The method is simple. The edges are beveled or veed as with casting welding, but to an included angle of about 60 deg. It is thoroughly cleaned off and the parts or edges to be welded are brought up to a dull heat with the aid of a torch. The temperature range for such welding is limited and therefore great care is necessary to avoid getting the metal too hot or too cold.

A special bronze welding rod is used for welding cast-iron pieces. The vee must be tinned properly. The operation then starts with feeding the metal very slowly at first, and then when so using the low melting rod it is applied rapidly and swiftly without stopping till finished.

It is important to heat the weld sufficiently below the cracks to prevent additional cracks and warping due to the rapid feeding and application of the welding metal. Proper tinning insures rapid work and overheating must be avoided and a neutral flame maintained; the correct size of top must be used in accordance with the thickness of the metal to be welded. The metal must also not be allowed to flow ahead of the part tinned.

Conclusions

It is clear that welding and related repair work play a large part in the maintenance of plant and equipment in the rock products industries.

The practice of submitting such repairs to large well equipped shops having the necessary equipment and experience seems to be sound procedure and affords ample opportunities to save money in many instances.

Much can be learned from the repair shops maintained by the large cement, oil and pipe line companies for such large esuipment.

Many thousands of dollars may be saved by the application and use of advanced machine shop and welding repair methods in the reclamation of large castings, forgings and machine parts that fracture or break.

Machine shops and like enterprises, for welding and similar work, should be encouraged in the industry, and any experience and assistance to be found should in some way become better known to the industry generally.

Tacoma, Wash., Has Modern Ready-Mix Plant

THE Tru-Mix concrete plant operated by George Scofield Co. at Tacoma, Wash., represents the best thought in design at the time it was built, and differs from the ordinary plant in several essential details. In the first place, a relatively large bin storage (800 cu. yd.) is contained over an area of 36 ft. square. This permits a development of three 10-ft. driveways each way, through and under the bin structure. Bracing is eliminated in the bottom zone which provides cab clearance for trucks. This arrangement gives the greatest possible accessibility.

The bin arrangement is such that seven different grades of material are kept separate and identified, which permits the manufacture of a batch of concrete to any given sieve analysis.

The bins are also so arranged that the easterly truck lane supplies paving batch trucks. The center lane supplies fine sand, pea gravel and special materials to truck loading. The westerly lane supplies building sand and gravel for truck loading, Tru-Mix being loaded at the front of the structure into a truck spotted either sideways or endways. This arrangement permits the movement of trucks in and out of the yard in an orderly progression and conserves yard space.

The mixing plant proper is equipped with the most modern control equipment available. A 10,000-lb. Toledo scale is used for aggregate proportioning. Water is measured by a special vertical double-gage tank and a final check on consistency and time of mix is provided by a Mixometer.

Cement, which is elevated to the cement deck from either car or warehouse at ground level, is proportioned by sack and dumped into a scale hopper by buggies. A conveyor system supplying the bins with aggregates runs from the crane at waterfront, a distance of 240 ft. on a 15 deg. 30 min. incline. This is housed with galvanized iron housing. The main belt is 24 in. wide and is fed from a hopper.

Material is unloaded from scows to the belt hopper with a 2-yd. clamshell bucket, operated by a hammer head crane designed and installed by the Star Iron & Steel Co. of Tacoma. This equipment, weighing approximately 80 tons, is one of the largest in the West used in this type of work, and has a capacity of 150 cu. yd. an hour.

Throughout, the plant is one of the most modern west of Chicago.—*Pacific Builder and Engineer.*

Another Sand and Gravel Producer Makes Ready-Mix at Wheeling, W. Va.

A NEW INDUSTRY—one that is equally beneficial to the large contracting concern and the small home worker who prefers to do his own concreting work—has been founded in Wheeling, W. Va.

The Standard Sand and Gravel Co., located between Thirty-fourth and Thirty-fifth streets, from Market to the river, brings the new industry, which is the ready-mix concrete plant. This is the only plant of its kind in the district, and has the largest production of any plant from Pittsburgh to Cincinnati.

The Standard Sand and Gravel Co. can deliver concrete within a radius of 15 miles. In this deivery, all local trucks are used. The plant has a storage capacity of 1000 cars of sand, gravel and other concrete-making materials. It can mix and deliver 500 cu. yd. of concrete per day.

In 1922, the Standard Sand and Gravel Co. was organized. It was located at the Wheeling wharf on Twelfth street. In 1925 they erected a modern plant at Thirty-fourth street, and it was this fall that the latest addition was made in its program of expansion.

Shortly after the erection of the south side plant, the company installed its own machine shop, which allowed for the employment of several more men. This work was formerly done in Pittsburgh. Most of the material is receivel by the river route, being brought here by the company's steel barges. The unloading plant, consisting of a stiff-leg derrick with a 100-ft. beam and a 1½-yd. clamshell bucket, enables the unloading of three barges, or approximately 800 cu. yd. of material per day.

One of the largest concrete mixers in the world is located at the plant. It is designed to produce 500 cu. yd. or 200 truck loads, of concrete per day. All the concrete produced undergoes rigid laboratory requirements and the equipment is capable of mixing various strengths. It is weighed and measured by scales approved by the U. S. Bureau of Standards and checked by the state sealer of weights and measures for absolute accuracy.

The plant is also equipped to produce hot concrete during the winter months. This makes concreting possible in extremely cold weather, when it would be impossible to do concrete work by ordinary methods.—*Wheeling* (W. Va.) *News.*

New Machinery and Equipment

New Pulverizer for Grinding Coal

THE FULLER LEHIGH CO., Fullerton, Penn., recently placed on the market a new Type B pulverizer for grinding coal. The new pulverizer is an air separation ball mill which retains all of the desirable features of the Lehigh mill.

The Type B pulverizer consists essentially of a top or separator section, an intermediate or pulverizing section, and a base or drive section. The top section is of heavy steel plate and cast-iron construction and contains the classifying cone, coal spout and the mechanism for adjusting the grinding pressure. The intermediate section is of heavy section cast-iron with carefully machined flanges to which are fastened the top and base sections. The grinding elements, coal basket and driving yoke are mounted in the intermediate section. The base or drive section is also of heavy section cast-iron and provides a very rigid support for the mill. This section encloses the air distributing chamber, main and thrust bearings, drive shafts and gears and the force-feed oiling system.

The grinding elements consist essentially of two rows of large diameter balls, two stationary and one rotating grinding rings. The rows of balls, one row mounted above the other, are separated and propelled by the rotating ring which is driven by and floats on the main driving shaft. Both the stationary and rotating grinding rings are made to gage in order to insure interchangeability. Grinding pressure between the balls and rings is applied and kept uniform by externally controlled steel springs mounted in the top section.

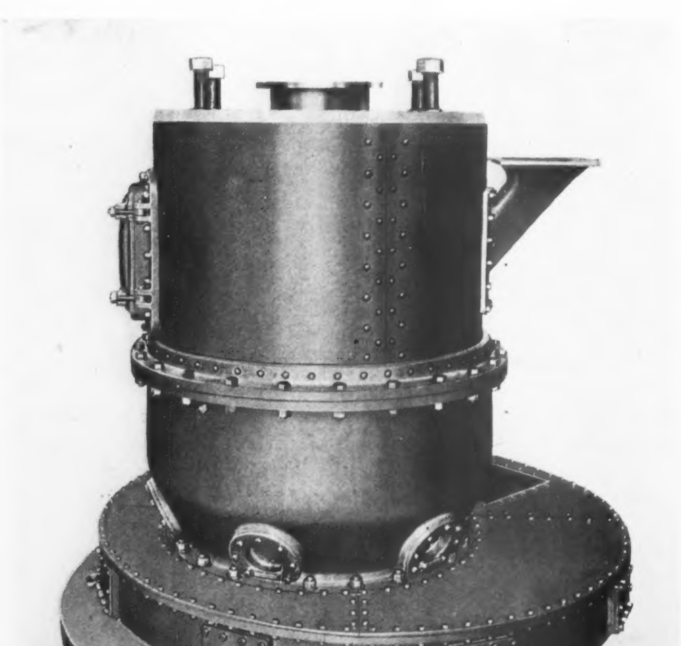
The main driving shaft is supported by a self-aligning heavy duty Rollway thrust bearing. No lubrication is required within the grinding zone of the Type B pulverizer. All bearings and gears are said to be effectively sealed from the grinding zone and are lubricated by an automatic force-feed oiling system.

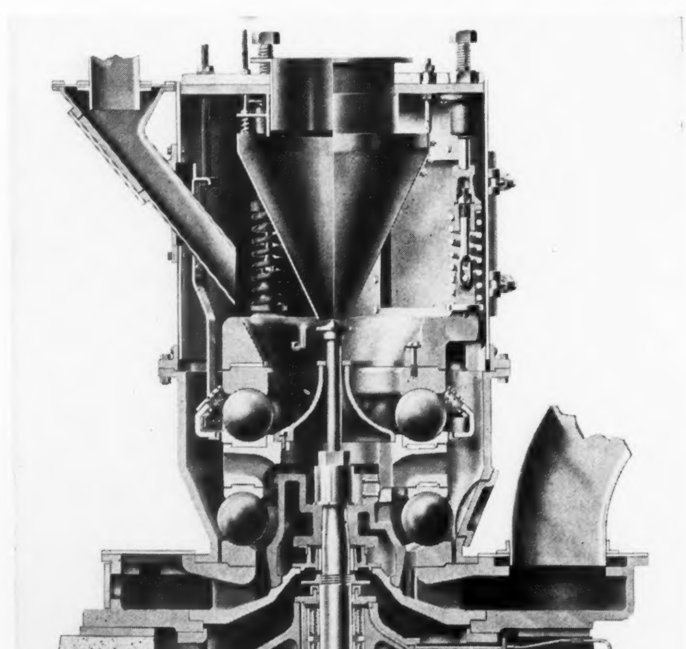
Operation of the pulverizer is as follows: Raw coal, crushed to pass through a ¾-in. ring, is fed to the mill from an overhead bunker by means of an independent drag feeder. It drops through the feed spout on to a rotating cone inside the upper row of grinding balls whence it is thrown outward into the path of the grinding balls by the centrifugal action of the revolving cone.

After the coal is ground in the upper row of balls, practically all of it is fine enough to pass the annular opening formed by the intermediate ring and the coal basket. Any foreign and ungrindable material, such as tramp iron, pyrites and rocks entering with the coal, is rejected by the balls to the coal basket.

The pulverized coal, after passing through the annular opening, encounters currents of preheated air that enter the air distributing chamber in the base and are discharged through openings in the intermediate grinding ring. Fines are entrained and carried upward by the air stream, while the coarse particles of coal drop into the lower row of grinding balls for further pulverizing. Upon reaching the desired fineness the coal is carried upward by the air stream.

As the separating air currents sweep through the mill the fines are quickly removed from the grinding zones. The air streams move upward, inside and through the lower rows of balls and then outward through the cored holes in the intermediate ring. These changes in direction cause the coarse particles of coal to be returned to the lower grinding balls. A similar action occurs as the coal stream again changes its





Two views of new pulverizer for grinding coal, the interior view at the right showing the details of construction

direction and sweeps upward to the top of the mill. An adjustable sleeve installed at the discharge opening of the mill prevents the coal stream from short circuiting passage through the classifying cone.

As the pulverized coal reaches the top of the mill coarse particles, carried upward with the fines, are rejected from the coal stream by either the force of gravity or action of the classifier. The coarse particles return to both rows of grinding balls for further pulverizing.

The Type B mill, it is claimed, is well adapted to the use of preheated air as a separating medium so that it can be adapted to installations where drying within the mill is to be used, eliminating the expense of independent drying and conveying equipment.

The concrete mixer is held to the truck frame with four U-bolts so that it can be taken off and put on readily

New steel drive chain for heavy power transmission

Steel Drive Chain for Heavy Power Transmission

A NEW STEEL DRIVE chain for heavy power transmission has been developed by Link-Belt Co., Indianapolis, Ind.

The new chain, known as the Link-Belt "Hyper Chain," is made from alloy steel, heat treated, and uses a new type of pin and cotter. The pins, bushings and holes in side bars are accurately ground, state the manuacturers, and the cotters are of a special type, so designed as not to work loose when once inserted and swelled into the holes provided in the pins for their reception.

The Hyper SS-40 chain has an ultimate strength of 75,000 lb. and the Hyper SS-124 chain an ultimate strength of 150,000 lb., it is said.

The manufacturing tolerances to which Hyper parts are held are extremely fine, 0.001 in., which, it is claimed, insures press fits of the highest order and results in a durable chain.

New Truck Concrete Mixer

THE TRUCK concrete mixer shown in the accompanying illustration is manufactured by Automix, Inc., Portland, Ore. The mixer is rated as a 1-yd. mixer, but according to the manufacturer it turns out at least 1¼-yd., and a 2-yd. size, for which patent claims are now pending, is to be manufactured.

The concrete chamber contains approximately 60 cu. ft., and there is also room for carrying approximately 60 gal. of water.

The machine operates from power take-off on Ford transmission through a multiple disc clutch and a worm drive. The worm gear is cushioned by eight springs in each direction so that the starting or stopping with a load is eased. It is claimed that the machine can be thrown into operation or out while the truck is going 30 miles an hour without noticeable vibration. Dumping is automatic.

The worm gear and beveled gears at the bottom of the worm shaft run in oil. Ball bearings are used in the bevel gear case as well as in three different places in the worm shaft.

The mixer is held to the truck frame with four U-bolts so that it can be taken off or put on very readily, and the machine, including Ford truck, weighs 5560 lb.

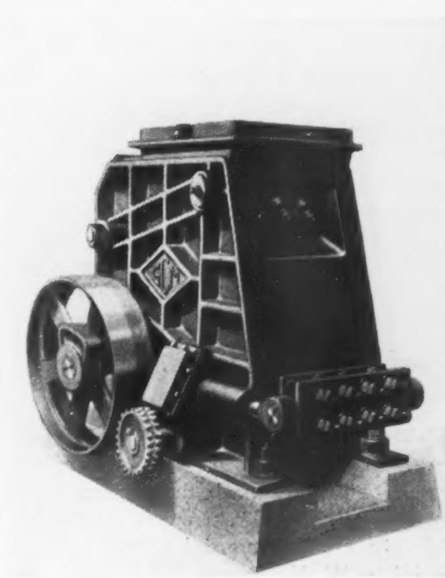
Jaw Crusher Embodies Unusual Principle of Design

THE NEW JAW CRUSHER being manufactured by the Guest Crushing Machines, Inc., Los Angeles, Calif., embodies some radical improvements, it is claimed.

The crusher incorporates the yielding jaw principle and utilizes roller bearings throughout. The crushing action, after material is crushed to size, is downward for ⅛ of each revolution, serving to give an added impetus over the action of a free-falling body. The machine may be used as a primary and secondary crusher or as either alone. The 6x16-in. size illustrated will handle 9 tons of rock per hour when set at ¼ in., taking into consideration a maximum feed of 6-in. material, delivering a uniform crushed product of 5/16-in. size, it is claimed. The ratio of reduction in this case is 19 to 1.

Outstanding features of the new GCM crusher include the breakable shear pin which prevents throwing the motor shaft out of alignment in case foreign material becomes lodged in the crusher jaws. Provision is also made for instant release of this foreign matter without the necessity of explosives or expensive dismantling. All working parts are readily accessible, while the size adjustment of the finished product can be accomplished while the machine is operating, the manufacturer claims.

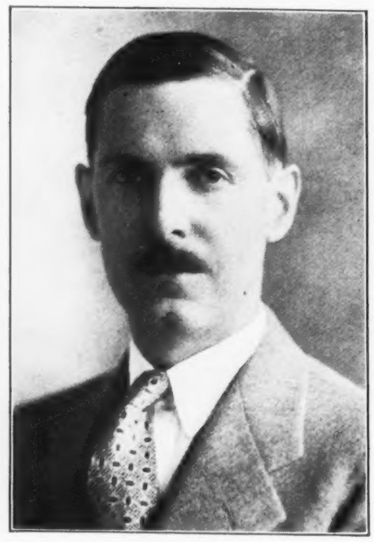
Bearings used are the Norma Hoffmann roller type with positive oil and dust seal.



New jaw crusher embodies many improvements


J. S. Vrabek


H. A. Tomlinson


W. T. Doyle

Two More Vice-Presidents

THE Sturtevant Mill Co., Boston, Mass., announces that W. T. Doyle has been made a vice-president of the company. Having broad training and experience in equipment design and manufacture, a first-hand knowledge of plant operations, a technical background of education plus a fund of information gained from field contacts both here and in Europe, eminently fits him for his new duties, says the announcement.

H. A. Tomlinson, in charge of sales and of research of practically all substances which are crushed, ground, sized, or mixed, has also been made a vice-president. The announcement states further that he has built up a library of records pertaining to the problems of "the process industry," second to none, and which are invaluable as a reference; almost every substance which is reducible, or which is screened, air separated or mixed has passed through the Sturtevant laboratory and results recorded under Mr. Tomlinson's supervision.

The third new vice-president is J. S. Vrabek, whose promotion was announced in these columns, November 8, and whose portrait is here shown in connection with those of his associates.

Owens, Ohio, Lime Plant May Reopen

THE LIME QUARRY owned by the Owens Co. at Risingsun, Ohio, is expected to be opened for operation early in the spring, according to a rumor following an announcement from Mr. Owens' representative.

The Owens lime kilns at Owens have been abandoned, and it is expected that they will be built at Risingsun since the stone from the local quarry was shipped to the kilns at Owens. If kilns are established at Risingsun employment will be furnished almost a hundred men. The quality of lime from quarries near Bowling Green is good and a market for the finished product should not be difficult to find.—*Deshler* (Ohio) *Flag.*

Pueblo Lime Company Merges with Distributor

THROUGH a series of transactions just completed, the two large interests of the Pueblo Lime Co. and the Thomas and Brown Coal and Brokerage Co., Pueblo, Colo., have been merged into one business headed by W. N. Thomas and to be known as the Thomas Coal and Lime Co., it was announced recently.

With the combining of the two large firms, which will place the lime kilns just north of the Eighth street viaduct into control of the Thomas Coal and Lime Co., the firm has set up new offices at the corner of Ninth street and Bradford avenue. The articles of incorporation of the old Thomas and Brown Co. have been amended, changing the name and placing the capital at $60,000.

Jay D. Thomas, owner of the Pueblo Clay Products Co., and formerly in control of the Pueblo Lime Co., will continue to manage the affairs of the former firm, he announced.—*Pueblo* (Colo.) *Chieftain.*

Chemical Lime Company, Bellefonte, Penn., Has Reorganized

AT A MEETING of the board of directors of the Chemical Lime Co., Inc., Bellefonte, Penn., held in Baltimore, Md., recently, H. D. Brigstocke, formerly secretary and treasurer of the company, was elected executive vice-president of the company.

H. G. Pattee was elected secretary and treasurer.

Robert S. Walker, who has been associated with the company for 17 years will continue as production manager.

O. H. Nance, who was recently elected president of the company to succeed John L. Burns, due to his many business activities in Baltimore, will be unable to spend much time in Bellefonte. Mr. Brigstocke will have charge of the affairs of the company.

The company will make large capital expenditures this fall improving its properties and erecting storage facilities to care for increasing business.—*Williamsport* (Penn.) *Sun.*

Louis G. Gerhardt

LOUIS G. GERHARDT, sales manager of the Gypsum Products Corp., Seattle, Wash., died November 7, following a long illness.

Born in Bessemer, Mich., Mr. Gerhardt came to Seattle in 1907, later graduating from the B. F. Day grade and Lincoln high schools. He was graduated from the Department of Mining Engineering at the University of Washington in 1917. He received his master's degree at the University of Utah the following year. During the World war he served overseas as a lieutenant.

Mr. Gerhardt was a member of Arcana Lodge No. 87, A. F. and A. M., Lawson Consistory, and was a charter member of the Theta Xi Fraternity at the University of Washington. Surviving him are his widow and two daughters, Celia and Margaret; a sister, Celia, and three brothers, Paul, Wilbert and John Gerhardt, all of Seattle.

A California Lime Project

THE California Lime and Products Co., care of Richard L. Hollingsworth, secretary of Arcade Sand Co., Lincoln, Calif., recently organized by Mr. Hollingsworth and associates, has acquired property about 5 miles from Antelope, Calif., and is considering new lime and lime products plant to cost over $200,000 with machinery. The project will include a machine shop and power house. The company has also secured raw material properties near Colfax, Calif., and will install a mining plant.

Bayliss C. Clark, Sacramento, Calif., formerly city engineer of that city, will be the executive head of the new organization.

The Rock Products Market

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Attica and Franklinville, N. Y. (a)	.75	.75	.75	.75	.75	.75
Boston, Mass.‡	1.15	1.15	1.75		1.75	1.75
Buffalo, N. Y.		1.05	1.05	1.05	1.05	1.05
Erie, Penn.	.80	1.00				
Leeds Jct., Scarboro, Me., and Milton, N. H. (c)		.50		1.75	1.25	1.00e
Machias Junction, N. Y.	.65	.65	.65		.65	.65
Montoursville, Penn.	1.00	.70	.50	.40	.40	.40
Northern New Jersey	.20- .50	.20- .50	1.00-1.25	1.00-1.25	1.00-1.25	
Georgetown, D. C.	.55	.55	1.00	1.00	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.30	.20	.20	.35	.35	.40
Attica, Ind.			All sizes .75-.85			
Cincinnati, Ohio	.55	.55	.80	.80	.80	.80
Columbus, Ohio	.75-1.00	.50- .75	.60- .75	.60- .75	.60- .75	.60- .75
Des Moines, Iowa	.40- .70	.40- .70	1.50-1.85	1.50-1.85	1.50-1.85	1.50-1.85
Dresden, Ohio		.60	.70- .80	.75	.75	.70
Eau Claire, Wis.	.40	.40	.50	.85	.85	
Elkhart Lake and Glenbeulah, Wis.	.45	.40	.50	.55	.45	.50
Grand Rapids, Mich.	.40	.40	.70	.70	.70	.70
Greenville, Ohio	.50- .70	.40- .60	.50- .60	.50- .60	.50- .60	.50- .60
Hamilton, Ohio	.65- .75	.65- .75	.65- .75	.65- .75	.65- .75	.65- .75
Hersey, Mich.		.40		.70	.70	.70
Humboldt, Iowa		.45			1.25	
Kalamazoo, Mich.		.50	.50	.60	.65	
Kansas City, Mo.	.70	.70	.80	1.50		
Mankato, Minn.	.55	.45	1.25	1.25	1.25	1.25
Mason City, Iowa	.50	.50	.85	1.25	1.25	1.25
Milwaukee, Wis.		.86	.86	.96	.96	.96
Minneapolis, Minn.	.35	.35	1.35	1.35	1.35	1.25
Oxford, Mich.	.25- .35	.20- .30	.30- .40	.55- .75	.55- .75	.60- .75
St. Louis, Mo.	.45- .75	.45- .85	.50- .90	.50- .90	.50- .75	.50-1.00
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.00	1.00	1.00
SOUTHERN:						
Brewster, Fla. (d)	.40					
Charleston, W. Va.	.70	1.25	1.25			
Eustis, Fla.		.40- .50				
Fort Worth, Tex.	1.00	1.00	1.25	1.25	1.25	1.25
Knoxville, Tenn.	.80	1.00	1.50	1.20	1.20	1.20
Roseland, La.	.20	.20	.70	.70	.50	
WESTERN:						
Pheonix, Ariz.	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.80	.60		1.20		1.15
San Gabriel, San Fernando Valleys, Cal. (b)	.80	.80	1.30	1.30	1.30	1.30
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*	1.00*	1.00*

*Cu. yd. ‡Delivered on job by truck. (a) Prices on trucks; on cars, 65c per ton for all sizes. (b) Discount, 20c per ton if paid by 10th of month following delivery. (c) In carload lots. (d) To consumers 50c, (e) Gravel 2½-in. down to ¼-in.

Core and Foundry Sands

Silica sand quoted washed, dried, screened unless otherwise stated; per ton f.o.b. plant.

City or shipping point	Molding, fine	Molding, coarse	Molding brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.25			4.00	
Cheshire, Mass.	Sand for soap, 5.75-7.00					5.00	
Columbus, Ohio	1.35-1.50	1.25-1.50	2.00	1.25-1.35		3.50-4.50	
Dresden, Ohio	1.15-1.50	1.00-1.35	1.25-1.50	1.00-1.25	1.25		
Eau Claire, Wis.						2.50-3.00	
Elco, Ill.	Amorphous silica, 90-99½% thru 325 mesh, 10.00-60.00 per ton						
Kasota, Minn.							1.00
Montoursville, Penn.				1.50-1.60			
New Lexington, Ohio	2.00	1.25					
Ohlton, Ohio	1.60	1.60		1.75	1.60	1.75	
Ottawa, Ill.						3.50	
Red Wing, Minn. (a)					1.50	3.00	1.50
San Francisco, Calif.	3.50†	5.00†	3.50†	2.50-3.50†	5.00†	3.50-5.00†	
South Vineland, N. J.	Dry white silica sand, per ton, 2.25						

†Fresh water washed, steam dried. *Damp. (a) Filter sand, 3.00.

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Dresden, Ohio		1.00
Eau Claire, Wis.	4.30	1.00
Ohlton, Ohio	1.75	1.60
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50

Glass Sand

(Silica sand is quoted washed, dried and screened)

Cheshire, Mass. (in carload lots)	5.00
Klondike, Mo.	2.00
Ohlton, Ohio	2.50
Ottawa, Ill.	1.50
Red Wing, Minn.	1.50
South Vineland, N. J.	1.75
San Francisco, Calif.	4.00-5.00

Bank Run Sand and Gravel

Algonquin, Ill.¶ (½-in. and less)	.30
Buffalo, N. Y.—Sand, 1/10-in. down, 1.00; ¼-in. down, .85; gravel, all sizes	.75
Burnside, Conn. (sand, ¼-in. and less)	.75*
Fort Worth, Tex.¶ (2-in. and less)	.70
Gainesville, Tex.¶ (1-in. and less)	.55
Grand Rapids, Mich.¶ (1-in. and less)	.50
Hersey, Mich.¶ (1-in. and less)	.50
Kalamazoo, Mich.¶ (1½-in. and less)	.35
Mankato, Minn.†	.70
Winona, Minn.—Sand, any size	.50- .60
York, Penn.—Sand, 1/10-in. down, 1.10; ¼-in. and less	1.00

*Cu. yd. †Fine sand. 1/10-in. down. ¶Gravel.

ROCK PRODUCTS solicits volunteers to furnish accurate price quotations.

Portland Cement

	F.o.b. city named Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.92½	3.70	
Atlanta, Ga.		2.19*	3.49¶
Baltimore, Md.		†2.23-2.26*	3.56¶
Birmingham, Ala.		1.85*	3.15¶
Boston, Mass.	.47	†1.85-1.88*	3.27¶
Buffalo, N. Y.	.51¼	†2.02-2.05*	3.25¶
Cedar Rapids, Ia.		2.23*	
Charleston, S. C.		1.85†	3.26¶
Cheyenne, Wyo.	.71¼	2.86	
Chicago, Ill.		1.95*	3.25¶
Cincinnati, Ohio		2.14*	3.44¶
Cleveland, Ohio		2.04*	3.34¶
Columbus, Ohio		2.17*	3.47¶
Dallas, Texas		1.90*	3.49¶
Davenport, Iowa		2.14*	
Dayton, Ohio		2.14*	3.44¶
Denver, Colo.	.76¼	3.05	
Des Moines, Iowa	.48½	2.29*	
Detroit, Mich.		1.95*	3.25¶
Duluth, Minn.		2.04*	
Houston, Texas		2.00*	3.73¶
Indianapolis, Ind.	.54¾	1.99*	3.29¶
Jackson Miss.		2.29*	3.59¶
Jacksonville, Fla.		2.16†	3.46¶
Jersey City, N. J.		†2.10-2.13*	3.43¶
Kansas City, Mo.	.50½	2.02*	3.32¶
Los Angeles, Calif.	.57½	2.30	
Louisville, Ky.	.55½	2.12*	3.42¶
Memphis, Tenn.		2.29*	3.59¶
Milwaukee, Wis.		2.10*	3.40¶
Minneapolis, Minn.		2.27*	
Montreal, Que.		1.60‖	
New Orleans, La.		1.92†	3.22¶
New York, N. Y.	.50¾	†2.00-2.03*	3.33¶
Norfolk, Va.		1.97*	3.27¶
Oklahoma City, Okla.	.61½	2.46*	3.76¶
Omaha, Neb.	.59	2.36*	3.66¶
Peoria, Ill.		2.12*	
Pittsburgh, Penn.		†1.92-1.95*	3.25¶
Philadelphia, Penn.		†2.12-2.15*	3.45¶
Portland, Ore.		2.50†	
Reno, Nev.		2.96†	
Richmond, Va.		†2.29-2.32*	3.62¶
San Francisco, Calif.		2.24‡	
Savannah, Ga.		1.85†	
St. Louis, Mo.	.48¾	1.95*	3.25¶
St. Paul, Minn.		2.27*	
Seattle, Wash.		1.50-1.75	2.40c
Tampa, Fla.		2.00†	
Toledo, Ohio		*2.10-2.20†	3.50¶
Topeka, Kan.	.55¼	2.21*	3.51¶
Tulsa, Okla.	.58¼	2.33*	3.63¶
Wheeling, W. Va.		†1.99-2.02*	3.32¶
Winston-Salem, N.C.		2.44*	3.74¶

Mill prices f.o.b. in carload lots, without bags, to contractors.

		Per Bbl.	High Early Strength
Albany, N. Y.		2.15	
Bellingham, Wash.		2.25	
Bonner Springs, Kan.		1.85	3.15¶
Buffington, Ind.		1.70	
Concrete, Wash.		2.65	
Hannibal, Mo.		1.80	
Hudson, N. Y.		1.85	3.30¶
Independence, Kan.		1.85	
Leeds, Ala.		1.70	
Limedale, Ind.		1.70	
Lime & Oswego, Ore.		2.50	
Nazareth, Penn.		2.15	
Northampton, Penn.		1.75	
Richard City, Tenn.		2.05	
Steelton, Minn.		1.85	
Toledo, Ohio		2.20	
Universal, Penn.		1.70	
Waco, Tex.		1.85	

NOTE: Unless otherwise noted, prices quoted are net prices, without charge for bags. Add 40c per bbl. for bags. *Includes dealer and cash discounts. †Includes 10c cash discount. ‡Subject to 2% cash discount. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c discount 15 days. ‖Includes sales tax. (c) Quick-hardening "Velo," packed in paper bags.

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chazy, N. Y.	.75	1.60	1.60	1.30	1.30	1.30
Farmington, Conn. (a)	1.00	1.30	1.30	1.00	1.00	....
Ft. Spring, W. Va.	.35	1.35	1.35	1.25	1.15	1.00
Frederick, Md.	.50–1.00	1.50	1.15–1.50	1.15–1.50	1.05–1.25	1.05–1.25
Oriskany Falls and Munnsville, N. Y.	.50–1.00	....	....	1.00–1.35	....	....
Prospect Junction, N. Y.	.50– .80	....	1.00–1.15	1.00–1.10	1.00–1.10	....
Rochester, N. Y.—Dolomite	1.50e	....	....	....	....	....
Hillsville, Penn.	.85	1.35	1.35	1.35	1.35	1.35
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.75	....	1.75	....	....	....
Afton, Mich.	.25	.25	.25	....	.65	1.50
Cypress, Ill.	1.25	.90	.90	.90	.85	.85
Dubuque, Iowa	....	....	1.10	1.10	1.10	....
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05–1.70	1.05–1.70	....
Greencastle, Ind.	1.25	1.00	1.00	.90	.90	.90
Lannon, Wis.	.80	.80	.80	.80	.80	.80
Sheboygan, Wis.	1.20	1.20	1.10	1.10	....	....
Stone City, Iowa	.75	....	1.10	1.00	1.00	1.00f
Toledo, Ohio	1.60	1.70	....	1.60	....	1.60
Toronto, Canada (j)	2.10	2.10	2.10	2.10	2.10	2.10
Waukesha, Wis.	....	.90	.90	.90	.90	....
SOUTHERN:						
Bridgeport, Chico and Knippa, Texas	1.00–1.10	1.25–1.30	1.20–1.25	1.15–1.20	1.10–1.15	1.05–1.10
Cartersville, Ga.	.75	1.15	1.15	1.00	.90	.90
El Paso, Texas	.50– .75	1.25	1.25	1.00	1.00	1.00
Olive Hill, Ky.	.50	1.00	1.00	.90	.90	.90
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.70
Blue Springs and Wymore, Neb. (h)	.25	.25	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.10	1.25	1.25	1.25	1.00	....
Rock Hill, St. Louis Co., Mo.	1.30–1.40	1.30–1.40	1.10–1.40	1.30–1.40	1.30–1.40	1.30–1.40
Stringtown, Okla.	1.00–1.10	1.25–1.30	1.20–1.25	1.15–1.20	1.10–1.15	1.05–1.10

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn.	1.20	1.60	1.45	1.35	....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	....
Bridgeport, Chico and Knippa, Texas	2.25–2.50	1.80–2.00	1.50–1.60	1.30–1.40	1.20–1.30	1.00–1.25
Duluth, Minn.	1.00	2.25	1.75	1.65	1.35	1.25
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	....
Northern New Jersey	1.35–1.40	1.70–2.10	1.90	1.50	1.50	....
Richmond, Calif.	.75	1.00	1.00	1.00	1.00	....
Stringtown, Okla.	2.25–2.50	1.80–2.00	1.50–1.60	1.30–1.40	1.20–1.30	1.00–1.25
Toronto, Canada (j)	4.70	5.80	4.05	4.05	....	....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Cayce, S. C.—Granite	....	....	1.60	1.60	1.50	....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40b
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.—Granite	.50	1.25	1.25	1.15	1.15	....
Lohrville, Wis.—Granite	1.80	1.60	....	1.50	1.50	....
Middlebrook, Mo.—Granite	3.00–3.50	....	2.00–2.25	2.00–2.25	....	1.25–3.00
San Gabriel and San Fernando Valleys, Calif. (Granite)	....	1.30	1.30	1.30	....	1.30
(Basalt)	....	....	....	.85	....	....
Toccoa, Ga.—Granite	.35	....	1.25	1.25	1.00	1.00

(a) Stone 1-in., 1.10 per net ton. (b) Ballast. (c) 1-in., 1.40. (d) 2-in., 1.30. (e) Less 10c. (f) Rip rap. (g) Cu. yd. (h) Rip rap, 1.20–1.40 per ton. (j) All prices less 5% for payment 15th following month.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem, Penn.	1.25–1.50	.50– .60	1.00	.60– .70	.70– .80	.70– .90	.90
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Hokendauqua, Penn.	1.50	.60	1.00	.80–1.00	1.00–1.25	1.00–1.25	1.00–1.25
Western Pennsylvania	2.00	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.30*	1.80*	1.45*	1.45*	1.45*	....
Jackson, Ohio	2.05*	.65*	1.80*	1.30*	1.05*	1.30*	....
Toledo, Ohio	1.50	1.10	1.35	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.	2.05*	1.05*	1.65*	1.45*	1.45*	1.45*	....
Ensley and Birmingham, Ala.	2.05	.55	1.25	1.15	.90	.90	.90
Longdale, Va.	2.50	1.25	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05*	.55*	....	1.15*	.90*	.90*	....

5c per ton discount on terms. †1½-in. to ¼-in., 1.05; ⅝-in. to 10 mesh, 1.25*; ⅝-in. to 0-in., 90c*; ¼-in. to 10 mesh, .80*.

Agricultural Limestone
(Pulverized)

Alton, Ill.—Analysis, 99% $CaCO_3$; 0.3% $MgCO_3$, 90% thru 100 mesh	4.75
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh	1.50
Cartersville, Ga.	2.00
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, per ton	6.00
Gibsonburg, Ohio—Bulk, 2.25; in bags	3.70
Hillsville, Penn.	1.00–4.50
Jamesville, N. Y.—Bulk, 3.50; in 80-lb. bags	4.75
Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, in 100-lb. paper bags, 3.75; bulk	2.50
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton	2.00
Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh	4.25
West Rutland, Vt. — Analysis, 96.5% $CaCO_3$; 1% $MgCO_3$; 90% thru 50 mesh; bags, per ton, 4.25; bulk	2.50

Agricultural Limestone
(Crushed)

Bedford, Ind.—Analysis, 98.44% $CaCO_3$; 0.83% $MgCO_3$; 95% thru 10 mesh	1.50
Cartersville, Ga.—50% thru 50 mesh, per ton	1.25
Colton, Calif.—Analysis, 95-97% $CaCO_3$; 1.31% $MgCO_3$, all thru 14 mesh down to powder	3.50
Cypress, Ill. — Analysis, 96% $CaCO_3$; 90% thru 100 mesh, 1.25; 50% thru 100 mesh, 1.25; 90% thru 50 mesh, 1.25; 50% thru 50 mesh, 1.25; 90% thru 4 mesh, 1.25, and 50% thru 4 mesh	1.25
Davenport, Iowa — Analysis, 92-98% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 4 mesh, 50% thru 20 mesh; bulk, per ton	1.00
Dubuque, Ia.—Analysis, 64.20% $CaCO_3$; 32.64% $MgCO_3$; 90% thru 50 mesh	1.10
Fort Spring, W. Va.—Analysis, 90% $CaCO_3$; 3% $MgCO_3$; 50% thru 100 mesh; bulk, per ton	1.15
Gibsonburg, Ohio—90% thru 10 mesh	1.00–1.50
Lannon, Wis. — Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh	2.00
Screenings (¼-in. to dust)	1.00
Marblehead, Ohio—90% thru 100 mesh	3.00
90% thru 50 mesh	2.00
90% thru 4 mesh	1.00
Marlbrook, Va.—Precipitated lime-marl. Analysis, 96% $CaCO_3$; 1% $MgCO_3$, 90% thru 50 mesh, bulk, 2.25; in burlap bags	3.75
Olive Hill, Ky.—90% thru 4 mesh, per ton	.50–1.00
Branchton, Penn.—100% thru 20 mesh, 60% thru 100 mesh, and 45% thru 200 mesh, per ton	a5.00
Piqua, Ohio—30%, 50% and 99% thru 100 mesh	1.00–4.00
Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh	1.15–1.70
Stone City, Ia.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
West Stockbridge, Mass.* — Analysis, 95% $CaCO_3$; 90% thru 100 mesh, bulk	3.50
100-lb. paper bags, 4.75; 100-lb., cloth	5.25
Waukesha, Wis.—90% thru 100 mesh, 4.00; 50% thru 100 mesh	2.10

*Less 25c cash 15 days. (a) Less 50c comm.

Pulverized Limestone for Coal Operators

Davenport, Iowa—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; sacks, ton	6.00
Joliet, Ill.—Analysis, 48% $CaCO_3$; 42% $MgCO_3$; 90% thru 200 mesh (bags extra)	3.50
Piqua, Ohio—99% thru 100 mesh, bulk, 3.25; in 80-lb. or 100-lb. bags	4.25
Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk	2.25–3.50
Waukesha, Wis.—90% thru 100 mesh, bulk	4.00

Lime Products

(Carload prices per ton f.o.b. shipping point unless otherwise noted)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Bulk	Ground burnt lime, Bags	Lump lime In bulk	Lump lime In bbl.
EASTERN:								
Berkeley, R. I.	....	....	11.40	....	....	17.50	....	20.65
Buffalo, N. Y.	....	....	....	11.00	....	....	....	....
Cedar Hollow, Devault, Mill Lane, Knickerbocker, Rambo and Swedeland, Penn.	....	9.50b	9.50b	9.50b	8.00f	9.50d	8.50	....
Frederick, Md.	....	8.50	8.50	8.50	....	8.50	6.50	13.50
Lime Ridge, Penn.	....	....	8.00	....	6.00	7.50[1]	4.50	....
West Stockbridge, Mass.	....	8.25– 8.75	8.25– 8.75	....	....	13.50h	10.00	15.35
CENTRAL:								
Afton, Mich.	....	....	....	....	....	10.85	6.50	....
Gibsonburg and Cold Springs, Ohio	7.75	6.00	6.00	....	6.00	8.00	6.00	....
Huntington, Ind.	....	6.00	....	....	6.00	....	....	....
Marblehead, Ohio	....	6.00	6.00	11.00	....	....	6.00	....
Milltown, Ind.	....	9.00	8.25	9.50	7.50	....	7.00	....
Scioto, Ohio	7.75	6.00	6.00	7.00	....	....	6.00	15.00
Sheboygan, Wis.	....	10.50	10.50	10.50	....	....	9.50	20.00e
White Rock, Ohio	7.75	....	6.00	....	6.00	8.00	6.00	....
Woodville, Ohio	7.75	6.00	6.00	9.00	6.00	8.00	6.00	15.00c
SOUTHERN:								
Keystone, Ala.	17.00	7.00	....	7.00– 8.00	5.00g	11.55	5.00a	12.65
Knoxville, Tenn.	....	....	....	....	5.50	11.55	5.00	12.65
Ocala, Fla.	....	10.00	....	....	....	....	....	9.50
Pine Hill, Ky.	....	9.00	8.00	7.00– 9.00	....	....	6.00	12.50
WESTERN:								
Little Rock, Ark.	....	14.30	....	14.30	....	....	11.90	....
Kirtland, N. M.	....	....	....	....	....	....	15.00	....
Los Angeles, Calif.	15.50	15.50	....	....	....	....	13.50	18.00
San Francisco, Calif.†	20.00	20.00	12.00	20.00	....	....	....	....
San Francisco, Calif.	19.00	14.00–17.00	12.50	14.00–19.00	14.50[5]	....	11.00[4]	....

[1]In 100-lb. bags. [4]To 14.50. [5]Also 13.00. *Price to dealers. †Wood-burnt lime: finishing hydrate, 20.00 per ton; pulv. lime, 2.00 per iron drum. Oil-burnt pulv. lime, 13.00–14.50 per ton. (a) To 7.00. (b) In 50-lb. paper. (c) In steel; in wood, 14.00. (d) In 80-lb. paper bags. (e) In steel. (f) For chemical purposes. (g) To 7.00. (h) To 17.50.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 300 mesh, 7.00 per ton in paper bags

Slate Granules

Esmont, Va.—Blue, 7.50 per ton.

Granville, N. Y.—Red, green and black, 7.50 per ton.

Pen Argyl, Penn.—Blue-black, 6.00 per ton in bulk.

Roofing Slate

Prices per square—Standard thickness

City or shipping point	3/16-in.	1/4-in.	3/8-in.	1/2-in.	3/4-in.	1-in.
Bangor, Penn.—						
Gen. Bangor No. 1 clear	10.00–14.00	20.00	25.00	29.00	40.00	50.00
Gen. Bangor No. 1 ribbon	9.00–10.25	16.00	20.00	25.00	35.00	46.00
No. 1 Albion	7.25–10.50	16.00	23.00	27.00	37.00	46.00
Gen. Bangor No. 2 ribbon	6.75– 7.25	....	....	....	....	....
Granville, N. Y.—						
Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green & gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple & unfading gr'n	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Pen Argyl, Penn.						
Graduated slate	....	16.00	23.00	27.00	37.00	46.00
No. 1 clear (smooth text)	7.25–10.50; Albion-Bangor medium, 8.00–9.00; No. 1 ribbon, 8.00–8.50					

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:	
Crude talc, per ton	5.00
Ground talc (20-50 mesh), bags	6.50
Ground talc (150-200 mesh), bags	9.00
Pencils and steel crayons, gross	1.50– 2.00
Chester, Vt.—Finely ground talc (carloads), Grade A—99-99¼% thru 200 mesh, 8.00–8.50; Grade B, 97-98% thru 200 mesh	7.50– 8.00
1.00 per ton extra for 50-lb. paper bags; 166⅔-lb. burlap bags, 15c each; 200-lb. burlap bags, 18c each. Credit for return of burlap bags. Terms 1%, 10 days.	
Clifton, Va.:	
Ground talc (150-200 mesh), in bags	10.00
Emeryville, N. Y.:	
Ground talc (200 mesh), bags	13.75
Ground talc (325 mesh), bags	14.75
Hailesboro, N. Y.:	
Ground talc (300-350 mesh), in 200-lb. bags	15.00–20.00
Henry, Va.:	
Crude (mine run), bulk	3.00– 4.50
Ground talc (150-200 mesh), in bags	6.25– 8.25
Joliet, Ill.:	
Ground talc (200 mesh), in bags:	
California talc	30.00
Southern talc	20.00
Illinois talc	10.00
Los Angeles, Calif.:	
Ground talc (150-200 mesh), in bags	15.00–25.00
Natural Bridge, N. Y.:	
Ground talc (325 mesh), bags	10.00–15.00

Rock Phosphate

Prices given are per ton (2240 lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-70%	3.50– 4.00
Mt. Pleasant, Tenn.—B.P.L. 76-78%	6.75

Ground Rock

(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 65-72%	3.50– 4.00
Mt. Pleasant, Tenn.—(Lime phosphate)—B.P.L. 75%, without bags	11.80
Mt. Pleasant, Tenn.—B.P.L. 72%	5.00– 5.50

Florida Phosphate

(Raw Land Pebble)

Mulberry, Fla.—Gross ton, f.o.b. mines	
68/66% B.P.L.	3.15
70% minimum B.P.L.	3.75
72% minimum B.P.L.	4.25
75/74% B.P.L.	5.25
77/76% B.P.L.	6.25

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

Rumney Depot, Bristol and Cardigan, N. H.—Per ton:	
Punch mica, per ton	150.00–240.00
Mine scrap	22.50
Mine run	325.00
Clean shop, scrap	25.00
Roofing mica	37.50
Trimmed mica, per ton, 20 mesh, 37.50; 40 mesh, 40.00; 60 mesh, 40.00; 100 mesh, 45.00; 200 mesh	60.00
Spruce Pine, N. C.—Mine scrap, per ton	18.00– 20.00
Trenton, N. J.—Mine scrap, per ton, f.o.b. mines	18.00

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

East St. Louis, Ill.—Special Gypsum Products—Partition section, 4 in. thick, 12 in. wide, and up to 10 ft. 3 in. long, 12c per ft., 21.00 per ton; outside wall section and interior bearing wall section, 6 in. wide, 6 in. thick, and up to 10 ft. 3 in. long, 25c per ft., 30.00 per ton; floor section, 7 in. thick, 16 in. wide, and up to 13 ft. 6 in. long, 17c per ft., 23.00 per ton.

City or shipping point	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	Plaster Board ¼x32x36". Per M Sq. Ft.	Plaster Board ⅜x32x36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Grand Rapids, Mich.	....	....	....	9.00	9.00	9.00	....	....	....	....	15.00	15.00	27.00
Los Angeles, Calif. (a)	....	7.50	7.50	10.00	12.20	....	13.20	....	....	....	....	....	....
Medicine Lodge, Kan.	1.45	....	....	....	....	....	11.50b	....	16.00d	....	....	....	....
San Francisco, Calif.	....	10.20d	....	....	12.90	....	13.90	....	....	....	....	....	....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	....	....	....	....	20.00	25.00e	33.00d

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) ⅜-in. plaster lath, 16c per sq. yd. (b) Includes paper bags. (c) Includes jute sacks. (d) "Gyproc," ⅜-in.x48-in. by 5 and 10 ft. long. (e) ⅜x48-in. by 3 to 4 ft. long.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream and coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Cranberry Creek, N. Y.—Bio-Spar, per ton in bags in carload lots, 9.00; less than carload lots, per ton in bags		12.00
Crown Point, N. Y.—Mica Spar	....	¶9.00–‖12.00
Davenport, Iowa — White limestone, in bags, ton	‖6.00	‖6.00
Middlebrook, Mo.—Red	....	20.00–25.00
Middlebury, Vt.—White	....	¶9.00–‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags	....	c5.50
Phillipsburg, N. J.—Royal green granite, in bags, per ton	15.00–18.00	....
Stockton, Calif.—"Nat-rock" roofing grits	....	12.00–20.00
Tuckahoe, N. Y.	7.00	....
Warren, N. H. (d)	....	¶8.00– 8.50

¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb. (c) Per ton f.o.b. quarry in carloads; 7.00 per ton L.C.L. (d) L.C.L., 9.50–15.00 per ton in 100-lb. bags.

Granular Glasspar

(Chemically Controlled)

Spruce Pine, N. C.—Color, white; analysis, K_2O, 7.20%; Na_2O, 3.70%; SiO_2, 70%; Fe_2O_3, 0.05%; Al_2O_3, 17.50%; per ton, in bulk	10.50

Soda Feldspar

De Kalb Jct., N. Y.—Color, white; pulverized (bags extra, burlap 2.00 per ton, paper 1.20 per ton); 99% thru 140 mesh, 16.00; 99% thru 200 mesh	18.00
Spruce Pine, N. C.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 5.50%; Na_2O, 5.50%; SiO_2, 68.80%; Fe_2O_3, 0.10%; Al_2O_3, 18.60%; per ton, in bulk	18.00

Potash Feldspar

Keystone, S. D.—Color, white; analysis, K_2O, 12.50%; NaO, 2.25%; SiO_2, 64%; Fe_2O_3, 0.03%; Al_2O_3, 20%, pulverized, 99% thru 200 mesh; in bags, 16.00; bulk	15.00
Crude, in bags, 7.50; bulk	6.50
East Liverpool, Ohio — Color, white; analysis, K_2O, 11.00%; Na_2O, 2.25%; SiO_2, 68.00%; Fe_2O_3, .08%; Al_2O_3, 17.95%, pulverized, 99% thru 200 mesh, in bags, 22.00; in bulk	20.00
Erwin, Tenn.—White; analysis, K_2O, 10.50%; Na_2O, 2.75%; SiO_2, 67.75%; Fe_2O_3, .08%; Al_2O_3, 18.00%, pulverized, 98% thru 200 mesh, in bags, 16.00; bulk	15.00
Crude, in bags, 7.50; bulk	6.50
Spruce Pine, N. C.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 11.30%; Na_2O, 2%; SiO_2, 67%; Fe_2O_3, 0.10%; Al_2O_3, 18.60%; per ton, in bulk	18.00
West Paris, Me.—(Chemically controlled.) Color, white; 200 mesh; analysis, K_2O, 11.20%; Na_2O, 3.20%; SiO_2, 65.70%; Fe_2O_3, 0.09%; Al_2O_3, 19.20%; per ton, in bulk	19.00
Rochester, N. Y.—Color, white; analysis, K_2O, 12.50%; Na_2O, 2.60%; SiO_2, 64.20%; Fe_2O_3, 0.06%; Al_2O_3, 19.10% pulverized 98% thru 200 mesh; in bags, 23.50; bulk	22.00

Cement Drain Tile

Graettinger, Iowa — Drain tile, per foot; 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in. 2.00

Grand Rapids, Mich.—Drain tile, per 1000 ft.

4-in.	40.00	15-in.	325.00
5-in.	50.00	18-in.	450.00
6-in.	75.00	20-in.	600.00
8-in.	110.00	22-in.	750.00
10-in.	165.00	24-in.	850.00
12-in.	190.00		

Chicken Grits

Cypress, Ill.—(Agstone)	1.15
Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per 100-lb. sack, f.o.b. Chico	1.00
Davenport, Iowa—High calcium carbonate limestone, in bags, L.C.L., per ton	6.00
El Paso, Tex.—(Limestone), per 100-lb. sack	.75
Los Angeles. Calif.—(Gypsum), per ton, including sacks	7.50– 9.50
Middlebury, Vt.—Per ton (a)	10.00
Piqua, Ohio—(Pearl grit), No. 1 and No. 2	1.00– 4.00
Port Clinton, Ohio—(Gypsum), per ton	6.00
Warren, N. H.	8.50– 9.50
Waukesha, Wis.—(Limestone), per ton	8.00
West Stockbridge, Mass.	¶7.50–‖9.00

(a) F.o.b. Middlebury, Vt. ¶C.L. ‖L.C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis. (f.o.b.) Barton)	9.50
Dayton, Ohio	12.50
Detroit, Mich.	13.00–15.50*
Flint, Mich.	15.50‡
Grand Rapids, Mich.	14.00
Iona, N. J.	10.50–12.00
Jackson, Mich.	13.00
Madison, Wis.	12.50†
Milwaukee, Wis.	12.50*
Minneapolis and St. Paul, Minn.	9.50*
Mishawaka, Ind.	11.00
New Brighton, Minn.	10.00
Pontiac, Mich.	11.50
Saginaw, Mich.	13.50
Sebewaing, Mich. (at yard)	12.50
Syracuse, N. Y.	18.00–20.00
Toronto, Canada	11.00–‡13.00*
Wilkinson, Fla.—White, 10.00; buff.	14.00
Winnipeg, Canada	15.00

*Delivered on job. †Less 50c dis. per M 10th of month. ‡5% disc., 10 days. §Delivered in city.

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	
Beloit, Wis.:	
8x8x16. Each	.15§
8x8x16. Each	.21‡
4x8x16. Each	.11§
6x8x16. Each	.13§
10x8x16. Each	.19§
Brookville, Penn.: 8x8x16	20.00–23.00*
Camden, N. J.: 8x8x16, each	.18
Chicago, Ill.:	
8x8x16. Each	.17§
8x8x16. Each	.20a
Columbus, Ohio: 8x8x16	14.00§–16.00‡
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12‡
Lexington, Ky.:	
8x8x16	‡18.00*
8x8x16	†16.00*
Los Angeles, Calif.:	
4x8x12	4.50*
4x6x12	3.90*
4x4x12	2.90*
Omaha, Neb.:	
8x 4x16, each .06½§; 8x6x16, each	.09§
8x 8x16, each .10§; 8x8x16, each	.12‡
8x12x16, each	.15§
Oak Park, Ill.:	
8x8x16, per 1000	160.00
Pittsburgh, Penn. (Prices at yard)	
8x 8x16. Each	.17§
8x 8x16. Each	.19a
8x12x16. Each	.20§
8x12x16. Each	.22a
Wichita, Kan.:	
8x8x16. Each	.11§

*Price per 100 at plant.
†Rock or panel face.
‡Face. §Plain. (a) Rock face.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Cicero, Ill.—French, Spanish, Closed End Shingle, and English Shingle, per sq.	9.50–13.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Lexington, Ky.—8x15, per sq.:	
Red	15.00
Green	18.00
Longview, Wash.:	
4x6x12-in., per 1000	55.00
4x8x12-in., per 1000	65.00
New York City, N. Y.:	
Roofing tile, per sq.	10.00–13.00

Cement Building Tile

Oak Park, Ill. (Haydite):		
8x 8x16, per 1000	200.00	
8x12x16, per 1000	300.00	
Lexington, Ky.:		
5x8x12, per 1000	55.00	
4x5x12, per 1000	35.00	
Longview, Wash. (Stone Tile):		
4x6x12, per 1000, at plant	54.00	
4x8x12, per 1000, at plant	64.00	
Wichita, Kan.: (Duntile)	Plain	Glazed
8x8x12. Each	.10½	.14
6x8x12. Each	.09½	.13
4x5x12. Each	.05	.08
4x4x12. Each	.04½	.07½

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Beloit, Wis.	18.00	28.00– 35.00
Camden & Trenton, N. J.	17.00	....
Oak Park, Ill., "Haydite"	16.00	....
Ensley, Ala., "Slagtex"	8.00–10.00	....
Longview, Wash.	16.50	22.00– 40.00
Milwaukee, Wis.	13.00	20.00– 36.00
Omaha, Neb.	18.00	30.00– 40.00
Prairie du Chien, Wis.	14.00	22.00– 25.00
Rapid City, S. D.	16.00	30.00

Fullers Earth

Prices per ton in carloads, f.o.b. Florida shipping points. Bags extra and returnable for full credit.

16– 30 mesh	20.00
30– 60 mesh	22.00
60–100 mesh	18.00
100 mesh and finer	9.00
Joliet, Ill.—All passing 100 mesh. Price per ton, f.o.b. Joliet, including cost of bags	24.00

Stone-Tile Hollow Brick

Prices are net per thousand, f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	29.00	42.50	53.00
Brownsville, Tex.	......	53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.	......	55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans La.	35.00	45.00	60.00
Norfolk Va.	35.00	50.00	65.00
Passaic, N. J.	40.00	52.50	70.00
Patchogue, N. Y.	......	60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% discount.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4-in.	6-in.	8-in.	10-in.	12-in.	15-in.	18-in.	20-in.	22-in.	24-in.	27-in.	30-in.	36-in.	42-in.	48-in.	54-in.	60-in.
Grand Rapids, Mich. (b)																	
Sewer	......	.12	.18–.20	.27⅓	.35	.57½	1.00	1.11	1.48	1.66	......	......	......	......	......	......	......
Culvert	......	......	......	.57	.67	.92	1.20	......	1.48	1.80	2.10	2.25	3.35	4.00	5.10	5.85	7.42
Indianapolis, Ind. (a)	......	......	......	.75	.85	.90	1.15	......	......	1.60	......	2.50	......	......	......	......	......
Milwaukee, Wis.	Cast stone window sills, 5 in. x 5½ in., 60c per lineal ft.																
Newark, N. J. (d)	......	......	......	......	.90	1.15	1.50	......	......	1.85	2.35	2.76	3.77	4.93	6.21	7.66	9.28
Unreinforced	......	.16	.25	.37	......	......	......	......	......	......	......	......	......	......	......	......	......
Norfolk, Neb.	......	......	......	.90	1.00	1.13	1.42	......	......	2.11	......	2.75	3.58	......	6.14	......	7.78
Tiskilwa, Ill.	......	......	......	.75	.85	.95	1.20	1.60	......	2.00	......	2.75	3.40	......	6.50	......	10.00
Wahoo, Neb. (c)	......	......	......	......	.85½	......	1.14	......	......	1.81	......	2.47	3.42	4.13	5.63	6.49	7.31

†21-in. diam. (a) 24-in. lengths. (b) Sewer, 21-in., 1.29; culvert, 21-in., 1.45. (c) Reinforced, 15.40 per ton, f.o.b. plant. (d) Reinforced, 21-in., 1.69; unreinforced, 21-in., 1.26; 5% cash discount.

News of All the Industry

Incorporation

Texas Pink Granite Co., Inc., Marble Falls, Tex., $100,000. Thomas and George D. Clark.

Ableman Granite and Sandstone Co., Ableman, Wis., 250 shares at $100 each. To produce stone, gravel, etc. W. Gall, Jr., B. Hintz and G. Volz.

Thomas Coal and Lime Co., Pueblo, Colo., $60,000 (formerly Thomas and Brown Coal and Brokerage Co.); W. N. Thomas, president.

Plainfield Sand and Gravel Co., Grand Rapids, Mich., 35,000 shares of no par value. Maurice Sluter, Kirk Sluter and Victor A. Blandford, Grand Rapids.

The State Concrete Pipe Co., Springfield Gardens, N. Y., $25,000. Edward H. Backemeyer, president; Frank Soviero, vice-president, and Fred Soviero, secretary and treasurer.

South Bend Sand and Gravel Corp., South Bend, Ind., 50,000 shares of no par value. To produce and deal in sand, gravel, silex, etc. James R. Beyrer, Julius B. Christman, William Howard Edwards and George J. Hoffman.

Crozite Brick and Tile Corp., Dover, Del., $5,000,000, consisting of 1,000,000 no par shares. To produce lime, plaster, brick and cement products. Alfred Owen Crozeir, Alice G. Maguire, New York City, and Gladys Norris, Freeport, N. Y.

Sand and Gravel

Ironton Gravel Co., Ironton, Ohio. George W. Mahl has been named receiver of the company as the result of a suit filed recently by G. C. Ross and Harry Nicely against the gravel company and Charles W. Jenkins.

Fillmore Rock Co., Fillmore, Calif., has contracted with the Macco Lumber Co. at Goleta, Calif., and the E. T. Carter Co. in Santa Barbara, Calif., for practically the entire output of its plant. By this arrangement the company will have an outlet for from 50 to 75 carloads of sand, gravel and rock per month.

Lyman-Richey Sand and Gravel Co.'s employes were guests at the company's annual banquet at Louisville, Neb., on November 18. The affair was planned by Superintendent and Mrs. E. Sundstrom, and among the officials from the Omaha office who attended were H. F. Curtis, president; L. C. Curtis, vice-president and general manager; Fred Curtis, vice-president; James Burke, secretary, and E. H. Palmquist, treasurer.

Rochester, Minn. Stripping of the Robert Waldron gravel pit on Highway 20 is to be done by the city's engineering department. The city council authorized the work being done by the engineering department when it was pointed out that the city could strip it as economically as a contractor could, and that it would prevent the necessity of dismissing several laborers of the engineers' department. Dirt removed will be used for fill-in work.

South Bend Sand and Gravel Corp., South Bend, Ind. This newly incorporated firm is a merger of the Beyrer Bros. Sand and Gravel Co. of Mishawaka, Ind., and George J. Hoffman Co., Midwest Sand and Gravel Co., and the H. G. Christman Sand and Gravel Co., all of South Bend. Extensive improvements in the gravel pits are planned by the directors of the new company, which will have temporary headquarters at 3113 Lincoln Way West, South Bend.

Quarries

Duluth, Minn. Fire of undetermined origin recently caused serious damage to a rock crusher owned by Bert Farrell, in Kenwood.

Belfast, Ia. Equipment is being installed in the prison stone quarry near Belfast, Ia., and the quarry is expected to be put in operation within a short time.

St. Paul, Ind. Daniel Link, employed in a stone quarry here, was seriously injured recently when he fell 16 ft. from the top of a stone crusher on which he had been working.

Indiana Limestone Co., Bedford, Ind., is reopening the old J. W. Hoadley stone quarry at Stinesville, Ind. Machinery and equipment are being placed in position and the quarry will be in operation within a short time.

Red Granite, Wis. Despite general business depression, local newspapers report that quarries in this section are enjoying better business than they have had in years. During a recent week more than 300 carloads of quarry products were shipped from here.

Penn Stone Co., St. Paul, Minn. Officials of the company visited Kasota, Minn., recently to look over the Huginin quarry holdings in this vicinity. It is reported that the company has purchased the holdings from the Huginin estate and is planning to start quarrying operations soon, shipping stone to its plants in the Twin Cities.

The Rocker Granite Quarry, which has been idle for a number of years, is being opened up by Frank L. Stewart, veteran granite quarryman of Sparta, Ga., and will be operated as soon as the necessary machinery is installed. Mr. Stewart was superintendent of the Georgia-Quincy Granite Co. for a number of years.

Iowa Limestone Co., Des Moines, Ia., operating a stone-crushing plant at Alden, Ia., has bought additional property consisting of 15 acres of land at a cost of $8,250, from which a further supply of rock for the company's operations will be obtained. The new property is located adjacent to the stone-crushing plant.

Oregon, Mo. Charles Hornecker has erected a crusher at his quarry at a cost of approximately $5000 and is supplying crushed limestone to the state under contract for road building. A crew of 20 men are employed in operating the quarry and crusher. The material has also been found suitable for soil liming, and the company plans to produce agricultural limestone later on.

Co-operative Sandstone Corp., Bloomington, Ind., incorporation notice of which appeared in ROCK PRODUCTS of November 22, is planning to have its quarry in operation very soon, according to E. W. Deckard, president of the company. The company has purchased 27 acres of land which, it is claimed, is underlaid with 125 ft. of sandstone of the highest quality.

Cement

Newaygo Portland Cement Co., Newaygo, Mich., has suspended production operations until March 1. Shipments, however, will continue as usual.

Columbia Cement Division of the Pittsburgh Plate Glass Co., Fultonham, Ohio. Members of the company and the public were invited to attend the masquerade dance given recently by the Columbia Club of the company. A good time was had by all.

Canada Cement Co. is planning the construction of a cement loading and unloading plant at St. John, N. S., next spring. The Canadian Pacific railway has commenced the work of laying spur track from its main line to the wharf on the property of the company.

Idaho Portland Cement Co., Inkom, Idaho. E. A. Stewart, an employe of the company, was severely injured recently when a shale bank at which he was working caved in. A rock slide resulted and the avalanche of stones and dirt was so great that he was swept out of the pit and was hurled bodily to the foot of the slope.

International Cement Corp., New York City, has issued a new bulletin on the advantages of "Incor" Perfected High-Early-Strength Portland Cement for winter construction work. The folder points out the fact that the principal added cost in winter construction is in providing protection from cold until the concrete attains service strength, and since "Incor" produces concrete that attains service strength 24 hours after it is placed, the cost of providing heat and protection is reduced proportionately.

Pacific Coast Cement Co., Seattle, Wash., recently celebrated the filling of its three-millionth sack of cement this year. According to reports, the company has enough orders ahead to keep the plant running at capacity for the next six months at least. More than 600,000 sacks of cement have been delivered to the Ariel dam which is being built in the southwestern part of the state. The "Diamond Cement," one of the company's ships, is now making weekly trips to Dall Island in Alaska, where the limestone quarries are located, and cargoes will be delivered at the plant from the north all during the winter.

Marquette Cement Manufacturing Co. has erected two silos at its Memphis, Tenn., plant at a cost of approximately $29,000. Of circular construction, the silos are 26 ft. in diameter and approximately 63 ft. in height. Cement is brought to Memphis in bulk by barge from the company's plant at Cape Girardeau, Mo. It is drawn from the barge through a pipe by compressed air and blown into the storage tanks or silos, from which point it passes through sacking machines and is loaded into cars. A great deal of cement furnished for the recent levee work on the Mississippi river, as well as cement used in west Tennessee and Mississippi, passes through the Memphis plant.

Gypsum

Atlantic Gypsum Products Co., Portsmouth, N. H., is planning to replace the building which was recently destroyed by fire.

Oakland, Calif. The city council has refused to grant permit to establish a gypsum plaster and stucco manufacturing plant at the southwest corner of Bond and Seminary Ave. The property is owned by E. D. Magoon and property owners in the vicinity have filed a protest against the plant.

United States Gypsum Co., Port Clinton, Ohio. Two 16-year-old Detroit youths recently attempted to hold up the company's gasoline station here. The pair asked for oil, and when Gustave Carpenter, the attendant, stooped over to pick up a can of oil he was struck on the head with a pipe. The boys fled and were later captured in a highway by the sheriff.

Cement Products

Shelton Concrete Products Co., Shelton, Wash., is reported to be practically rebuilding its plant, putting in new and larger gravel bunkers. Special screens will also be installed, as well as elevators and a monorail system.

P. M. Porter recently installed a new feeder at his cement products plant at Lindsay, Calif., for supplying the mixture to the pipe molds in the place of the former shoveling by hand. Two large bunkers have been erected above the shed housing the machinery, and a conveyor belt carries rock to the one and sand to the other. These feed into the mixer by gravity, and the mixer dumps on to a steel conveyor that carries the concrete up to the machine which feeds it into the shell in which the pipe is formed. The installation is housed in a new building, machinery and housing costing approximately $3500.

Miscellaneous Rock Products

Mena, Ark. Construction of a plant for the manufacture of slate products in Health Valley is now under way. Otto Lehrack, Jr., 5100 State Line St., Kansas City, Mo., is directing the work of building the plant.

Philadelphia Quartz Co. is said to be planning the immediate construction of an addition to its present plant at Sixth and Grayson Sts., Berkeley, Calif. It is estimated that the addition will cost about $100,000.

Hammill and Gillespie, Inc., New York City, importers and grinders of talc, Fuller's earth and other minerals, announce the opening of a new Manhattan warehouse "service" at Brooklyn Bridge Arch 14, Frankfort St.

Personals

Hugh Brown, traveling representative for the Keystone Lime and Stone Co., Logansport, Ind., was seriously injured near Indianapolis in an automobile accident.

Hans Mumm, Jr., president of the Everett Concrete Products Co., Everett, Wash., has been reelected a trustee of the Automobile Club of Washington.

Richard M. Spalding was recently married to Miss Alice Sherwood Miller at Newark, Ohio. Mr. Spalding is a representative for the Lehigh Portland Cement Co.

George F. Coffin of Easton, Penn., general manager of the Nazareth Portland Cement Co., has been elected treasurer of the Portland Cement Association.

Monroe B. Lanier, chairman of the board of the Kentucky Consolidated Stone Co., Louisville, Ky., and president of the Kentucky Electric Power Co., has been elected a director of the Freeport Texas Co.

Frank Fuhr has resigned his position as manager of operations of the Consolidated Mining and

Smelting Co. at Fernie, B. C. He expects to take a position with the company's sales department which is being organized in Toronto.

Joe Rheaume, president, and **J. A. Hetu**, superintendent, of the Maisonneuve Quarry Co., Ltd., Montreal, Que., recently visited the plants and quarries of the Dolomite Products Co., Inc., at Rochester, N. Y.

Ernest S. Macgowan, director of Northwest service for the Universal-Atlas Cement Co., addressed the St. Paul Builders Exchange at its recent monthly luncheon-meeting. Conditions in the cement industry was the subject of Mr. Macgowan's address.

Sam Hobbs of the Portland Cement Association recently gave a talk on the mnaufacture and uses of portland cement before the San Bernardino county chapter of the American Association of Engineers. The talk was illustrated with motion pictures.

Henry F. Koch, president of the Koch Sand and Gravel Co., Evansville, Ind., has been named chairman of the unemployment committee at Evansville to help relieve the unemployment situation in that city and to furnish food and clothing to the needy. Mr. Koch is a leader in civic affairs in Evansville.

Charles B. Bryant has been appointed senior assistant highway engineer of the State Roads Commission of Maryland. For the past eight years Mr. Bryant has been connected with the Portland Cement Association in field engineering work in Virginia, Pennsylvania and Maryland.

H. A. Schaffer is now engaged in special investigations and consultation work for the Western Precipitation Co., New York City. Mr. Schaffer was formerly conservation engineer for the Portland Cement Association and was also connected with the Bates Valve Bag Corp.

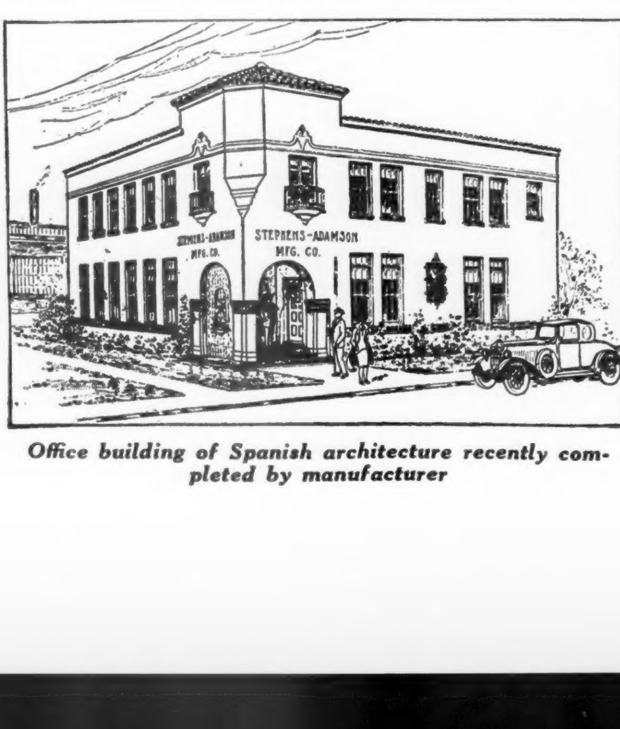
Manufacturers

Hercules Powder Co., Wilmington, Del., announces a number of changes in personnel in the supervision of its explosives plant management. In line with the company's policy of promotion and rotation, the following changes are announced by W. C. Hunt, director of operations, Hercules' explosives department: J. B. Johnson succeeds the late C. F. Bierbauer as superintendent of the Hercules, Calif., explosives plant; W. S. Brimijoin succeeds J. B. Johnson as superintendent of the Emporium, Penn., explosives plant; L. W. Babcock succeeds W. S. Brimijoin as superintendent of the Kenvil, N. J., explosives plant; M. M. Inskeep succeeds L. W. Babcock as assistant superintendent of the Bacchus, Utah, explosives plant; Andrew Van Beek succeeds M. M. Inskeep as assistant superintendent at Pluto explosives plant, Ishpeming, Mich.

Republic Steel Corp. recently placed in operation what is said to be the largest ladle-crane in the world, with a capacity of 275 tons. It has just been installed in the open-hearth division of the Youngstown plant, and is a part of a $1,000,000 improvement program. Two additional cranes of equal size will be installed within the next few weeks. A large addition to the open-hearth building has been constructed. The new equipment will increase the daily steel producing capacity of the 85-ton open-hearth furnaces to 120-ton capacity and provide for their later expansion to 250-ton capacity.

General Electric Co.'s employes, from president to office boy, who are working 50% or more of full time, will contribute 1% of their December wage to the company's new unemployment fund and the company will match such contributions dollar for dollar.

Stephens-Adamson Manufacturing Co.'s new office building at Los Angeles, Calif., is of Spanish architecture. The building is 50 ft. square, with hard textured stucco finish over brick and concrete walls. The dominant feature of the exterior is a corner tower surmounting an entrance loggia with round arched entrance, quarry tile floor and chamfered beam ceiling. Casement windows and two stone balconies with wrought iron railings are interesting features. On the first floor are the large general office, private offices, stationary storage room and rest rooms. The drafting room, blueprint room and supply room are on the second floor.



Office building of Spanish architecture recently completed by manufacturer

Joseph T. Ryerson and Son, Inc., Chicago, Ill., has recently acquired the stock and good will of the sheet metal division of the Richards Co., Inc., Boston, Mass., The Richards Co., founded in 1812, has built up a very good business of importing and distributing non-ferrous metals, rolling mill products and metal workers' supplies. It will continue in business, specializing in pig metals. In 1926 the Ryerson organization first entered the Boston territory through the purchase of the reinforcing bar division of the Penn Metal Co. Two years later the plant and steel merchandise of the E. P. Sanderson Co. were added, and the recent purchase has been made to increase the company's sheet metal facilities.

Turbo-Mixer Corp., New York City, has appointed the National Supply Corp. of that city to represent them in England, Roumania and the Argentine for all products of its manufacture for the petroleum industry. Western Engineering Co., San Francisco, Calif., will represent the company in the section of California north of the Tehachapi mountains.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Belting, etc. Catalog covering the Diamond line of belting, packing, hose, matting and miscellaneous items for industrial use, including such items as respirators, pump valves, stuffing box rings, pump diaphragm, gaskets and washers. THE DIAMOND RUBBER CO., Akron, Ohio.

Industrial Railways. Bulletin **No. 101** covering the A. C. F. line of industrial railway equipment for all kinds of operations—mines, quarries, sand and gravel pits, etc. Cars, track, trailers, trucks and skids are illustrated and described in this bulletin. AMERICAN CAR AND FOUNDRY CO., New York City.

Indicating and Recording Instruments. Pyrometers, flow meters, automatic controls, CO_2 recorders, long distance thermometers, resistance thermometers, pressure and vacuum gages and electric tachometers are covered in a new folder of THE BROWN INSTRUMENT CO., Philadelphia, Penn.

Sand and Gravel Plant Equipment. Machinery for screening, washing, conveying, elevating, storage, car moving and transmission of power in the sand and gravel or crushed stone plant, are described in a new bulletin, **No. 2936**, entitled "Repair and Replacement Equipment." WEBSTER AND WELLER MANUFACTURING COMPANIES, 1856 N. Kostner Ave., Chicago, Ill.

Floor Trucks. New catalog covering the complete line of Lewis-Shepard floor trucks, including the self-loading barrel and case truck, the two-wheel truck, the "Q" style roller equipped truck, the heavy duty trailer for long objects, enclosed dust-proof trailer, a special wagon-type truck and numerous others. Completely illustrated. LEWIS-SHEPARD CO., Boston, Mass.

Screen Cloth. Bulletin **No. 210** on the Rol-Man fine-mesh screen cloth made of drawn manganese-steel wire with a double-crimp weave, and available in sizes from 2-mesh down to 16-mesh, with square or rectangular openings and in desired wire diameters. For application to revolving, vibrating, shaking or inclined-gravity equipment. MANGANESE STEEL FORGE CO., Philadelphia, Penn.

Wire Rope. Booklet giving facts about Lay-Set preformed wire rope, especially efficient where the loaded cable operates over drums and sheaves and where loads are applied intermittently. Advantages claimed for this type of wire rope are longer life, that it is easy to handle, and that in Lay-Set each strand carries a balanced load and there is less tendency for high or low stranding. HAZARD WIRE ROPE CO., Wilkes-Barre, Penn.

Refractories. Of interest to all users of refractories is a booklet entitled "Brands of Refractories," the eighth edition of which has just been issued. The booklet gives the brands of fire brick and other refractories manufactured in the United States and Canada, together with a list of their producers. AMERICAN REFRACTORIES INSTITUTE, Oliver Bldg., Pittsburgh, Penn.

Nickel Alloy Steel Forgings. A paper, **No. 17,** dealing briefly with the manufacture, uses, analyses, heat treatment and properties of nickel alloy steel forgings larger than 4 in. in diameter or equivalent section. Paper **No. 1-A** gives the Society of Automotive Engineers Standard Specifications for Steels from the report of the Iron and Steel Division (last revision—June, 1929). THE INTERNATIONAL NICKEL CO., INC., New York City.

Spray Cooling Systems. Bulletin **No. 4-E** illustrating and describing the Binks Spray Cooling System for recooling, condensing and circulating water. The bulletin gives its applications, principles of operation, a table of the water ratios with corresponding temperature rise and cooling effects under various atmospheric conditions, power requirements, etc. BINKS MANUFACTURING CO., Chicago, Ill.

Dynamite Cases. The Explosives Service Bulletin for September gives a very instructive article by R. H. Summer, B. S., technical representative of the du Pont organization, on "Opening Dynamite Cases." The article describes and illustrates pictorially the proper way to open a dynamite case quickly and with safety, and will be of interest to those who are concerned with quarry blasting. E. I. DU PONT DE NEMOURS AND CO., INC., Wilmington, Del.

Electrodes. A circular describing Weldite Green Surfaced Electrodes for metallic arc welding of mild steel. The bulletin describes in detail the effect of green surfacing on the welding arc, the deposit metal and operating characteristics of the electrode; also the action of green surfacing as it is vaporized in the arc, and why it reduces welding costs. Many other vital facts for those using welding arcs are included in this circular, which may be had upon request to the FUSION WELDING CORP., 103rd St. and Torrence Ave., Chicago, Ill.

Flooring. The advantages of Rezilite for flooring for industrial plants are outlined in a new folder. This material comes semi-liquid in barrels, and is laid in a thickness of from 1/8 in. to 1/4 in. It is applied directly on the concrete slab, becomes an integral part of the floor and, according to the manufacturer, transforms the cold hard slab into a thoroughly sanitary, resilient, quiet, water-proof, cushion floor without seams. REZILITE MANUFACTURING CO., People's Gas Bldg., Chicago, Ill.

High Pressure Steam. "A Pioneer in High Pressure Steam" is the title of an interesting booklet telling how steam at near the critical pressure and with high superheat was used commercially in steam turbines as long ago as 1897. The early work of Dr. De Laval is described in the pamphlet, which reproduces many drawings and photographs of early designs, together with illustrations of more modern apparatus of similar characteristics, including high pressure turbines and pumps, speed reducing gears, etc. DE LAVAL STEAM TURBINE CO., Trenton, N. J.

Air Compressors. Bulletin **No. 153** covering two-stage tandem types of air compressors, including the Class 14-A and 15-A power and steam driven compressors, in which the low pressure cylinder is double acting and the high pressure cylinder single acting. Bulletin **No. 151,** describing the duplex air and gas compressors for either single-stage or two-stage compression, designed to meet the demand for larger volumes of air than it is practicable to furnish with single cylinder compressors. PENNSYLVANIA PUMP AND COMPRESSOR CO., Easton, Penn.

Screens. New catalog **No. 83,** describing the complete line of Rotex Screens, consisting of eighteen standard models. The line comprises the enclosed dust-tight Rotex built in fifteen models, ranging from a single-screen machine with 6 2/3 sq. ft. of screen area to a five-screen machine with a total screen area of 166 2/3 sq. ft. Also the open type, all steel, Rotex, built in three models designed to meet the capacity and separation requirements in the screening of coarse, heavy materials such as crushed rock, sand and gravel. THE ORVILLE SIMPSON CO., Cincinnati, Ohio.

Core Drills. Bulletin **No. 85-M** on the Sullivan Type "50" gasoline-engine-driven core drill for unusually deep structure test drilling. Bulletin **No. 85-L** on the Type "10" core drill, a light portable drill with a hydraulic swivel head, developed to meet the requirements of mineral prospecting to a depth of 300 ft. with "EX" fittings or 250 ft. with "AX" fittings. Bulletin **No. 139** is entitled "Core Drilling by Contact," and its purpose, state the manufacturers, is to remind engineers, mining companies, oil men and others of the facilities for undertaking mineral prospecting and test drilling contracts of all sorts with improved Sullivan diamond core drills. SULLIVAN MACHINERY CO., Chicago, Ill.

Strength of Dynamites by the Trauzl Lead Block Method

THE RESULTS of investigations and tests of the strength of dynamites when measured by the Trauzl block method are given in Report of Investigations No. 3039, by N. A. Tolch and G. St.J. Perrott, published by the U. S. Bureau of Mines, October, 1930. A paper by the same authors in December, 1929, showed the relative propulsive strengths of different dynamites as determined by the ballistic pendulum. The present paper gives strength data on the same dynamites used in the previous tests, but obtained with the Trauzl lead block method, and compares the results. The explosives tested were ammonia gelatin, gelatin, ammonia, and straight dynamite.

In making these tests cast lead blocks 20 cm. (7.87 in.) in both diameter and height, with a borehole 2.5 cm. (0.98 in.) in diameter by 12.5 cm. (4.92 in.) in depth, were used, the borehole averaging 60 c.cm. in volume. The charge was stemmed and tamped with 50 c.cm. of sand and exploded by a No. 6 electric detonator placed in the middle of the charge. The different charges were varied to give a constant volume of cavity after shooting, as previous investigations had shown this method to be more accurate than that of using constant charges and obtaining variable volumes of expansion. The constant volume used was 330 c.cm., which was the average from control shots made daily with 10 gm. of 40% straight dynamite, and which volume was believed to give the least error as indicated by the results of previous investigators. The volume of the original borehole was not deducted, since previous tests indicated greater accuracy without such correction. Also no deduction was made for the effect of the detonator.

The amount of the charge in grams necessary to obtain the 330 c.cm. expansion, or volume of cavity, was determined for each dynamite tested, and was used in connection with the charge necessary in the case of 100% blasting gelatin to compute the weight strength as a percentage of the 100% blasting gelatin strength. The bulk strength was obtained in the same way by also taking account of the relative densities of the dynamites as compared with the 100% gelatin.

The results obtained by the Trauzl block method showed some differences from those by the ballistic pendulum method, which differences are thought to be largely due to the effect of the rate of detonation. That is, in the ballistic method the rate of detonation does not seem to greatly affect the strength measurement, whereas in the Trauzl block method an increase in the rate of detonation gives higher strength values. Since the rate of detonation increases with the grade of the dynamite, the higher strength dynamites show higher strength values by the Trauzl block method than by the ballistic method.

As compared with the manufacturers' method of rating dynamites (according to the equivalent percentage by weight of nitroglycerin straight dynamite), the results by the Trauzl lead block method showed: Ammonia dynamites about 7% to 10% lower than their rated strength on both the weight and bulk basis; ammonia gelatin dynamites, 12% to 18% lower in weight strength and about 5% lower in bulk strength; gelatin dynamites, 6% to 13% lower in weight strength and slightly higher in bulk strength.

The relative strengths of the different types of dynamite were not much different in either the Trauzl block or ballistic methods, the order of increasing strength being ammonia gelatin, gelatin, ammonia, and straight dynamite.

TABLE 1—PRINCIPAL STATISTICS OF THE SAND-LIME BRICK INDUSTRY IN CANADA, 1925–1929

Year	Number of plants	Capital employed	Average number of employes	Salaries and wages	Cost of materials at works	Selling value of products at works	Value added by manufacturing
1925	10	$ 960,729	239	$ 257,116	$ 130,555	$ 854,055	$ 723,500
1926	10	1,082,577	218	223,599	197,400	629,672	432,272
1927	11	1,586,064	254	300,318	258,777	939,911	681,134
1928	11	1,916,060	270	352,311	322,027	1,112,466	790,439
1929	12	2,356,726	304	341,005	264,465	953,726	689,261

The Sand-Lime Brick Industry in Canada, 1929

PRODUCTION from the sand-lime brick industry in Canada during 1929 was valued at $953,726, a decline of 14% from the record established in the previous year at $1,112,466, but 15% higher than the average reported for the five-year period, 1924-1928. Output of sand-lime brick during the year under review amounted to 78,361,000 brick worth $953,726 as against a total of 82,271,000 brick valued at $1,038,510 in 1928 when the balance of the output consisted of hollow building blocks.

In 1929 a total of 12 plants were operating in Canada, 7 of which were located in Ontario, 2 in Quebec, 2 in Manitoba, and 1 in Alberta. These concerns employed a capital of $2,356,726 and distributed $341,005 in salaries and wages to a monthly average of 304 employes. Purchased materials cost $264,465 and the value added to the original cost by manufacturing processes was $689,261.

TABLE 2—MATERIALS USED IN THE SAND-LIME BRICK INDUSTRY IN CANADA, 1928 AND 1929

Item	1928 Quantity	1928 Cost at works	1929 Quantity	1929 Cost at works
Quicklime, bushels	467,011	$160,263	412,974	$140,784
Sand, cu. yd.	127,337	124,392	126,086	121,628
Other materials	....	37,352	....	2,053
Total	....	$322,007	....	$264,465

TABLE 3—PRODUCTS OF THE SAND-LIME BRICK INDUSTRY IN CANADA, 1928 AND 1929

Item	1928 Quantity	1928 Cost at works	1929 Quantity	1929 Cost at works
Sand-lime brick	82,271,000	$1,038,510	78,361,000	$953.726
Other products*	....	73,956	....	....
Total	....	$1,112,466	....	$953,726

*Includes hollow building blocks.

Yosemite Cement Co. Markets Quick Hardening Cement

TRIAL of a new cement manufactured in Merced, Calif., which is said to harden quicker than the ordinary product and be especially advantageous for repairing concrete pavement, was witnessed by City Engineer Lyle Payton, of Stockton, Calif., on a piece on Harrison street at the waterfront recently. The demonstration was made by the Yosemite Portland Cement Co.

Its manufacturers claim it will set completely in 24 hours, thereby causing little delay in opening of thoroughfares which are patched. In addition, the product costs but slightly more than half the price of the product previously used, Mr. Payton said. —*Stockton* (Calif.) *Record.*

Precipitation of Phosphate

CONDITIONS NECESSARY for the precipitation and ignition of magnesium ammonium phosphate, $MgNH_4PO_4 \cdot 6H_2O$, in determinations of phosphorus or magnesium are described in Research Paper No. 220, by J. I. Hoffman and G. E. F. Lundell, reprinted from the Bureau of Standards *Journal of Research,* August, 1930. The temperatures at which the precipitates should be heated to obtain the most reliable results are also given. In addition, the losses in weight of platinum crucibles at different temperatures, and the temperatures obtainable over Tirrill, Meker and Fischer burners, are also given.

"Dry-Ice" Copyrighted

SIR: We note in our issue of October 11, 1930, in an article headed "West Coast Lime Project Would Make Dry Ice" a use of the word "dry-ice" that may, we fear, mislead your readers as to the meaning and significance of the word.

"Dry-ice" is the trade-mark of the DryIce Corp. of America for solidified carbon dioxide. This trade-mark is registered in the United States Patent Office and in practically every state of the Union.

The trade-mark correctly used is: "Dry-Ice"—with the hyphen, capitals and quotes as shown. Much harm may be done if it is written—dry ice—because when so used there is no indication that it is a trade-mark.

DryIce Corp. of America.
By F. W. CAHILL.

New York, November 7, 1930.